FACTORY

MANAGEMENT AND MAINTENANCE

FEBRUARY 1949

SPECIAL REPORTS	What Labor Law in 1949?	66
	Industry's Planned Expansion Answers Truman Challenge	86
	Key Men in 1949 Legislation Affecting Industry	106
EDITORIAL	Management's Responsibility for a New Labor Law	65
PRODUCTION	Truck Control by Radio	73
	Less Handling, Lower Unit Cost	74
	Solving the Problem of Pattern Storage	79
	Cases in Work Simplification — 11. Oliver Iron & Steel Corp.	80
	Graphic Cost Control System for All Management Levels	82
	Close Scheduling Made Possible by Methods Study	114
	Better Salvage Methods Mean Bigger Recoveries at Lower Cost	118
	Conveyorized Packaging Line	131
MAINTENANCE	One-Card Inventory Control in Maintenance	77
	Zone Plan Assures Best Upkeep at Lowest Cost	78
	New Plant Is Protected Against Solvent Hazards	88
	How to Use Mercury-Arc Rectifiers	103
	What's Ahead in Plant Lighting	110
	Standby Equipment Puts Emergencies to Rout	126
	Plant Locker and Wash Rooms — *Maintenance Data Sheets*	136
INDUSTRIAL RELATIONS	How to Plan and Run Open House — *Plant Operation Library No. 117*	91
	Quarterly Merit Rating Tells Worker Where He Stands	116
	Holiday Observance and Pay Practices	121
	Incentive in Process Industry Gives 100 Per Cent Coverage	122
	Central First-Aid Building Insures Prompt Care	124
DEPARTMENTS	Looking Ahead in Labor, 129 • Looking Ahead in Business, 130 • Operating Shorts, 132 • What's New in Equipment, 140 • You Want to Know, 212 • Significant Labor Developments, 220 • They Say and Do, 240 • Behind the Byline, 248 • Books and Booklets, 254 • On the Calendar, 258 • Catalog Service, 266	

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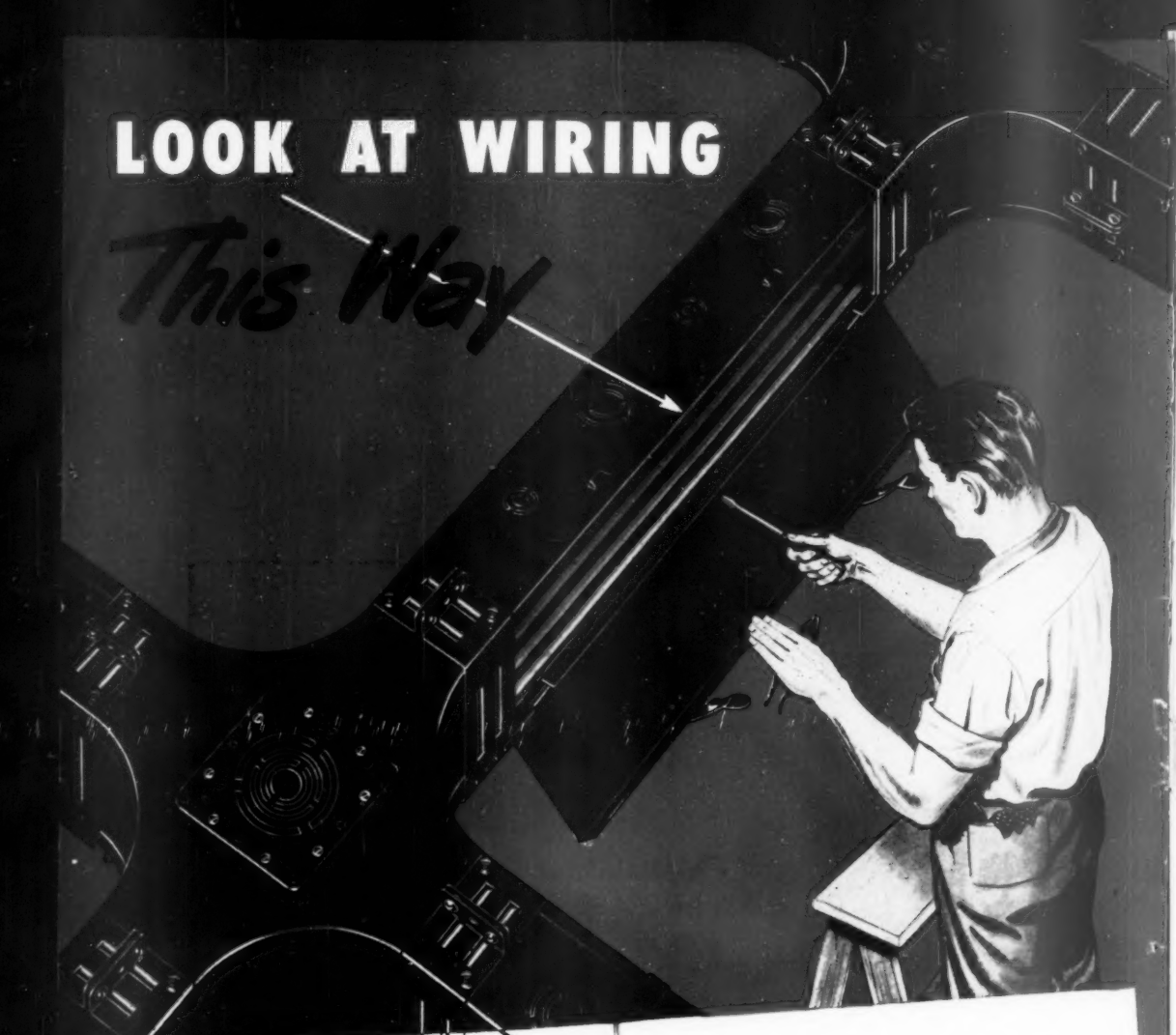

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MANAGEMENT and MAINTENANCE

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SPECIAL REPORTS

What Labor Law in 1949? 66
Industry's Planned Expansion Answers Truman Challenge . . 86
Key Men in 1949 Legislation Affecting Industry 106

EDITORIALS

McGraw-Hill Surveys Business Needs . . . . . *preceding* 65
Management's Responsibility for a New Labor Law 65

PRODUCTION

Truck Control by Radio 73
Less Handling, Lower Unit Cost 74
Solving the Problem of Pattern Storage 79
Cases in Work Simplification—11. Oliver Iron & Steel Corp. . . 80
Graphic Cost Control System for All Management Levels . . 82
Close Scheduling Made Possible by Methods Study 114
Better Salvage Methods Mean Bigger Recoveries at Lower Cost 118
Conveyorized Packaging Line 131

MAINTENANCE

One-Card Inventory Control in Maintenance 77
Zone Plan Assures Best Upkeep at Lowest Cost 78
New Plant Is Protected Against Solvent Hazards 88
How to Use Mercury-Arc Rectifiers 103
What's Ahead in Plant Lighting 110
Standby Equipment Puts Emergencies to Rout 126
Plant Locker and Wash Rooms—*Maintenance Data Sheets* . . 136

INDUSTRIAL RELATIONS

How to Plan and Run Open House —
Plant Operation Library No. 117 91
Quarterly Merit Rating Tells Worker Where He Stands . . . 116
Holiday Observance and Pay Practices 121
Incentive in Process Industry Gives 100 Per Cent Coverage . . 122
Central First-Aid Building Insures Prompt Care 124

DEPARTMENTS

Looking Ahead in Labor . 129
Looking Ahead in Business 130
Operating Shorts 132
What's New in Equipment . 140
You Want to Know . . . 212
Labor Developments . . . 220
They Say and Do 240
Behind the Byline 248
Books and Booklets . . . 254
On the Calendar 258
Catalog Service 266

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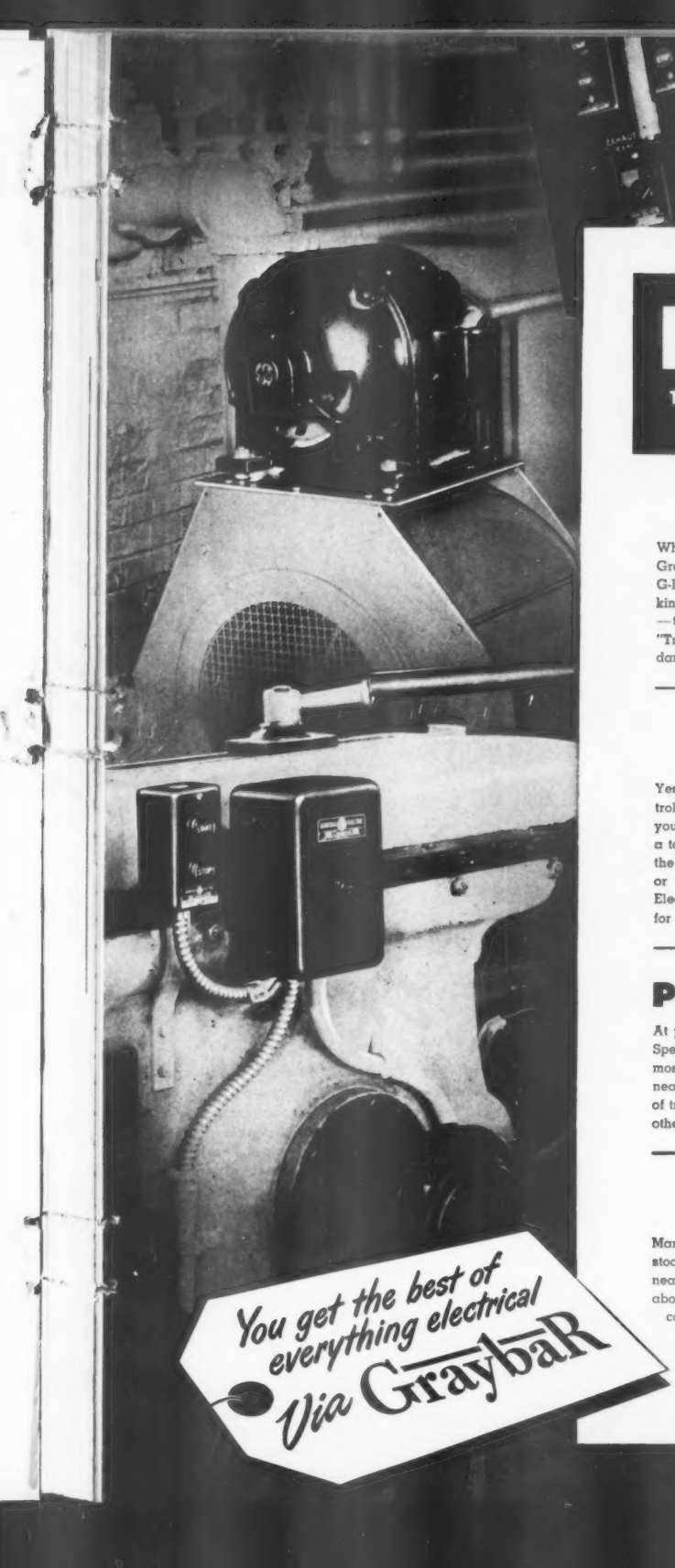

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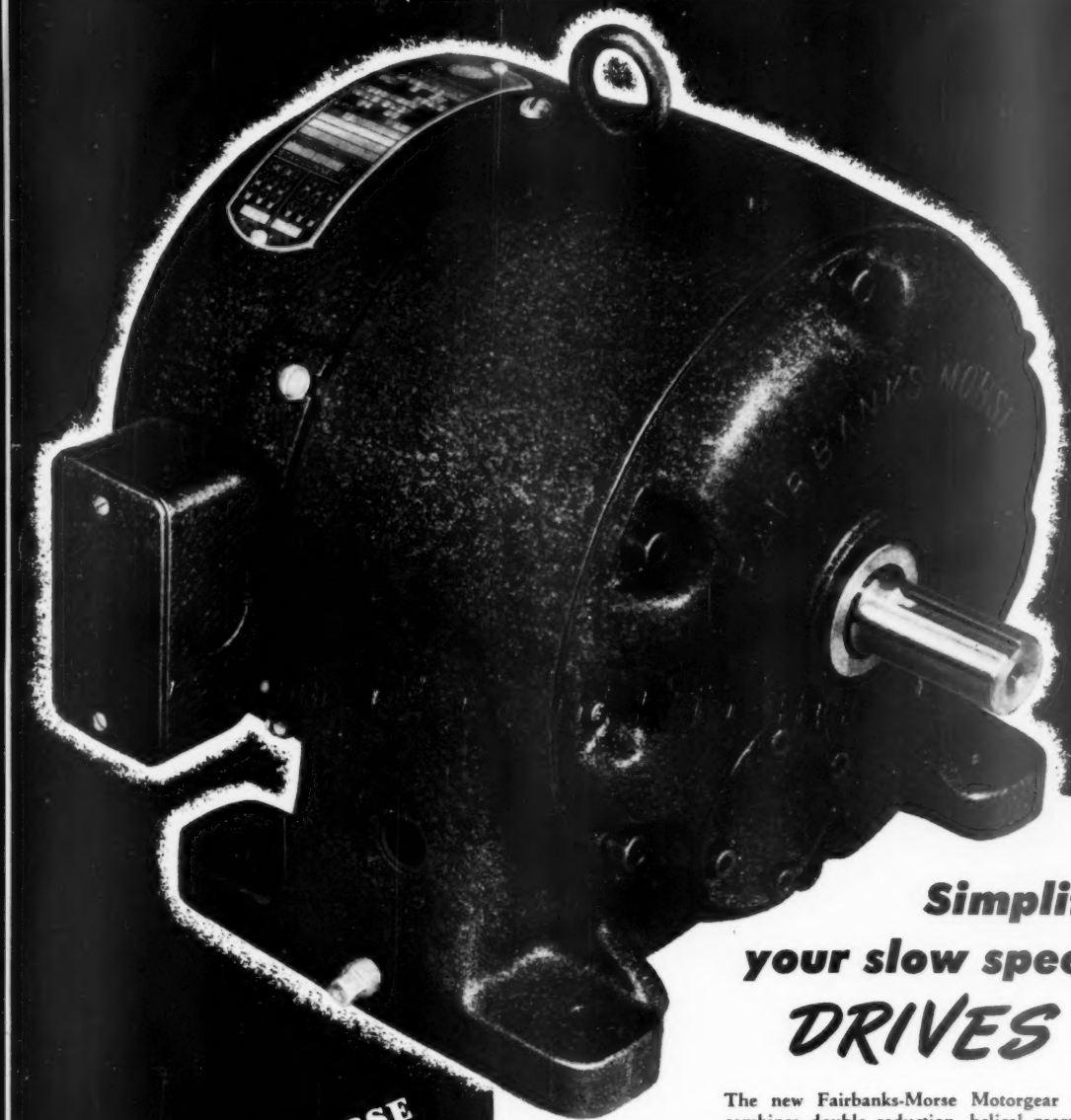

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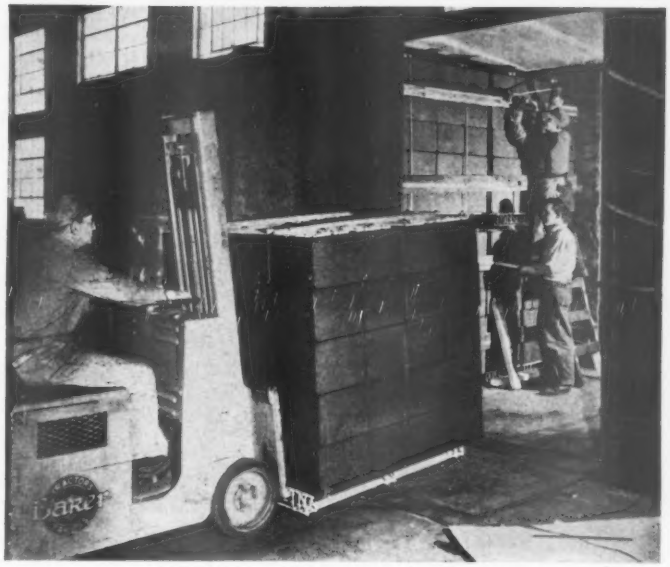

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Making this record required on-the-dot assembly-line coordination of production processes — plus *packing on pallets* and *loading into box cars* for shipment on schedule.

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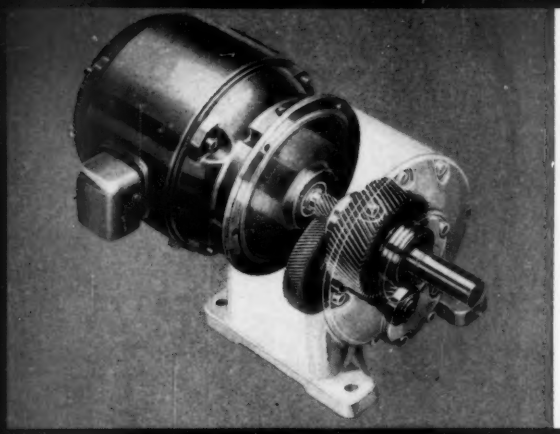

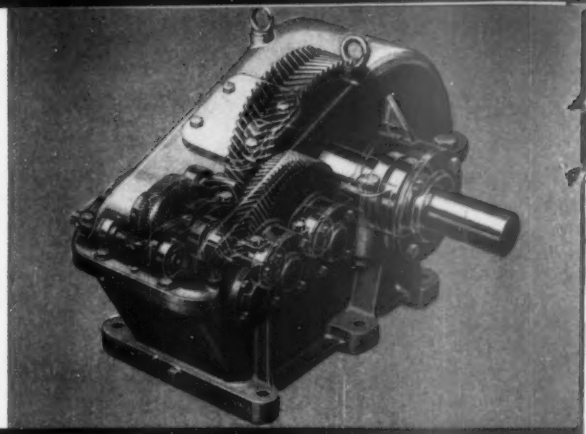

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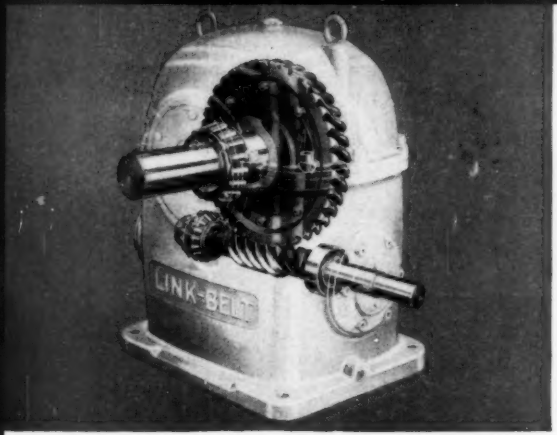

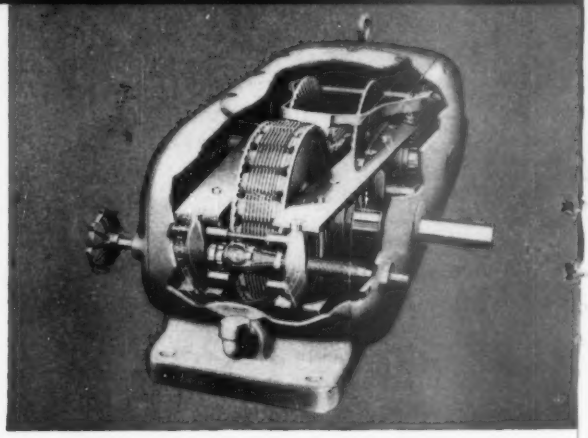

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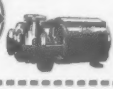

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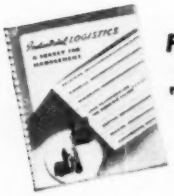

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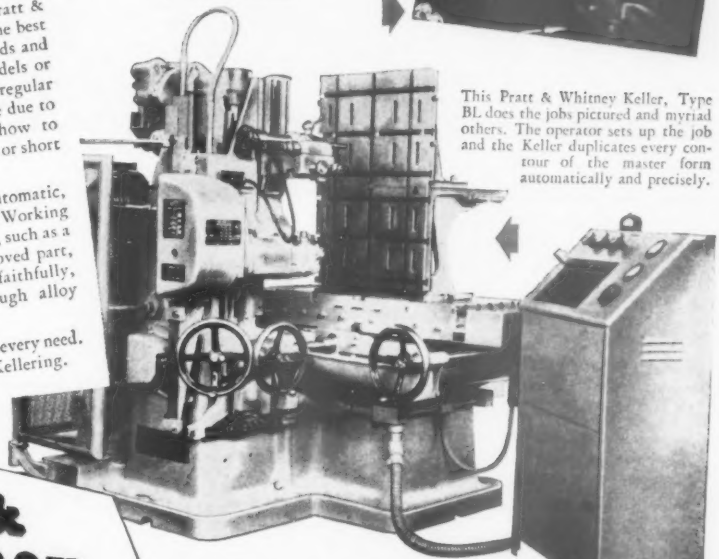

This Pratt & Whitney Keller, Type BL does the jobs pictured and myriad others. The operator sets up the job and the Keller duplicates every contour of the master form automatically and precisely.

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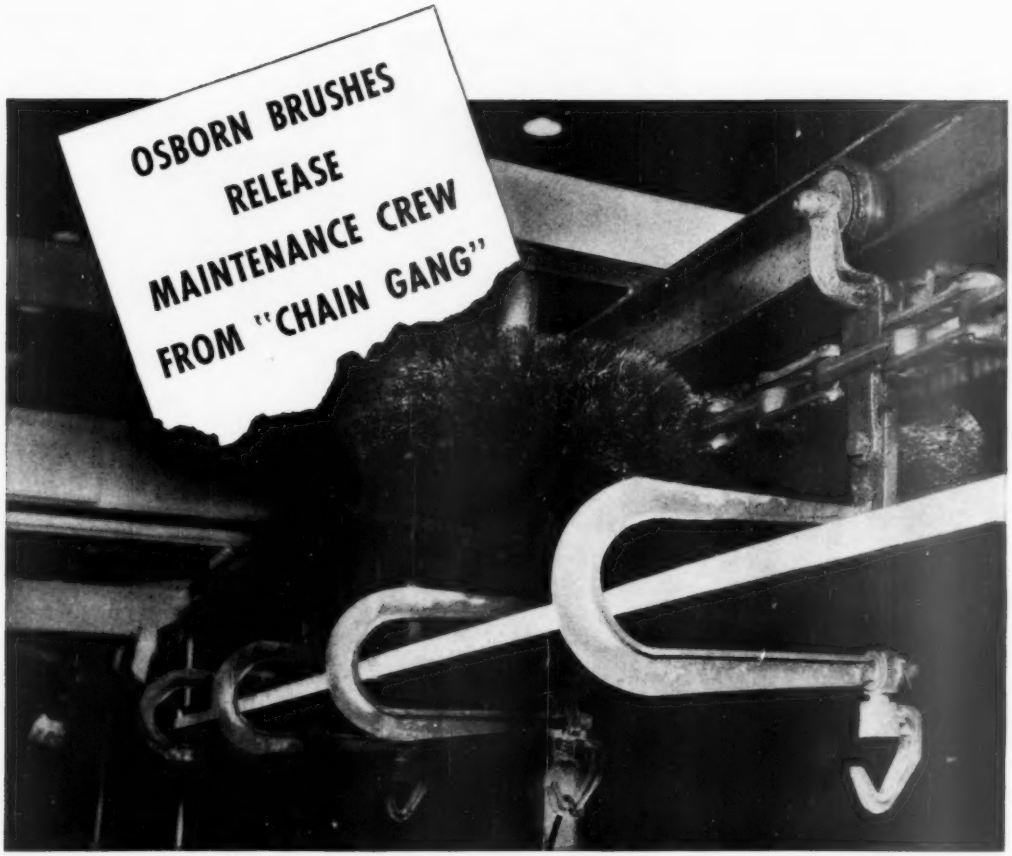

Continuous cleaning of conveyor chain with brushes simplifies maintenance at General Electric Refrigerator Plant

The new conveyor method of assembly employed at the General Electric Refrigerator Plant, Erie, Pa., is the last word in modern production practices. Here, starting with a compressor unit, a new General Electric Refrigerator literally grows before your eyes as it moves from one operation to another at a speed of 27 feet per minute.

But new ideas create new maintenance problems. At one point in the operation the conveyor chain passes through a rust-proofing solution. This results in a deposit of scale which must be removed from the chain. At first the chain was removed and cleaned in a caustic solution —obviously a costly and time-consuming operation.

Then an Osborn sales engineer was asked for suggestions. The answer and solution is shown above. An Osborn Disc Center Wire Brushing Wheel is mounted on either side of the chain. Revolving with the chain as it emerges from the bath, the brushes remove all dirt and scale. Cleaning is instant and continuous at a mere fraction of former costs.

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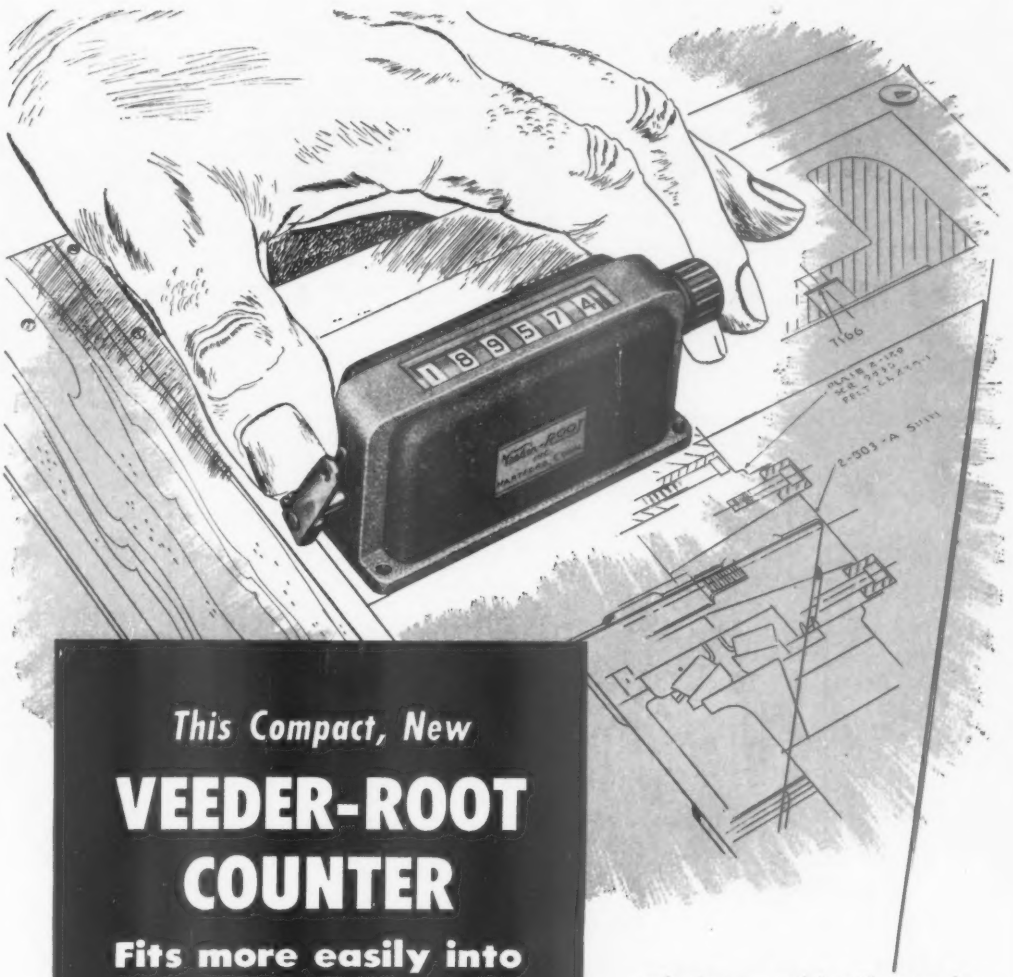
Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES



This Compact, New

VEEDER-ROOT COUNTER

Fits more easily into any product-design

Trim and slim as a fine timepiece . . . and even easier to read . . . this new general-purpose Series 1260 is the most important news in counters since the Veeder-Root bicycle cyclometer of 1868!

This eye-catching counter, richly finished in 2-tone grey to set off the "Ease-Eye" direct-reading line of 6 bold figures, will measurably add to the *appearance* . . . to the *utility* . . . and to the *marketability* of any machine or product into which it is built as an integral part. It will deliver continuous *Facts in Figures* on any phase of operation or production . . . and it will prove the product's guarantee.

And the new 1260 will fit into the closest design-limitations. For it measures only 4½" long, 1 9/16" high, 1½" wide . . . weighs only 12 ounces. Speeds from 1,000 to 5,000 counts per minute, depending on type of drive: ratchet, revolution, direct, or geared. Capacity is 1,000,000 counts. Then one turn of the knob resets to all zeros.

Look for this good-looking modern counter in the new machines and equipment you buy. And, by all means, look into its possibilities as a built-in *sales-builder for your own products.* Write.

VEEDER-ROOT INC.
Hartford 2, Connecticut

In Canada: Veeder-Root of Canada, Ltd., 995 St. James Street, Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Road, Dundee, Scotland

A N N O U N C I N G

THE

NEW

IMPROVED SOL-SPEEDI-DRI

OUT OUR WAY

THAT NEW SOL-SPEEDI-DRI SURE SEEMS LIGHTER AND FLUFFIER!
YEP, AND THE NEW SOL-SPEEDI-DRI COSTS LESS TO USE BECAUSE IT COVERS MORE AND ABSORBS MORE!
TAKES A BIGGER BAG NOW FOR SOL-SPEEDI-DRI 'CAUSE THERE'S MORE TO EVERY POUND!
THE PEOPLE WHO PRODUCE SOL-SPEEDI-DRI AIN'T ASLEEP! THEY MAKE SOL-SPEEDI-DRI BETTER AND BETTER ALL THE TIME
BIGGER AND BETTER
J.R.WILLIAMS
COPR. 1949 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

NEW SOL-SPEEDI-DRI
Gives You *More Volume* Per Pound

NEW SOL-SPEEDI-DRI
Covers More Floor Area Per Pound

NEW SOL-SPEEDI-DRI
Absorbs More Liquids Per Pound

WRITE FOR THE FACTS!

Yes, Sol-Speedi-Dri — the new, improved Sol-Speedi-Dri — is here! And it is more economical to use than ever before, because you get more bulk, more coverage, more absorption, per pound.

WHEN YOU BUY, BE *SURE* IT'S SOL-SPEEDI-DRI!

SAFETY & MAINTENANCE Co., Inc., 1 Wall Street, New York 5, N.Y. Warehouse stocks maintained in principal cities of the United States and Canada.

SOL·SPEEDI·DRI
THE ORIGINAL ABSORBENT FOR ALL LIQUIDS

AMAZING TRANSTACKER — FAMOUS FOR CUTTING HANDLING COSTS IN HALF

ADDS NEW *TILTING FEATURE*

For Faster, Safer Load Spotting and Cradling

LIFTS, MOVES AND STACKS...ALL YOU DO IS PRESS BUTTON

BATTERY CHARGING COST AS LITTLE AS 11¢ A DAY

This is the famous Automatic TRANSTACKER . . . the miracle truck of electric power that not only lifts and moves your material, but STACKS it to new heights . . . cutting handling costs as much as *one half*, and relieving labor from tedious back-breaking work.

Now, with its NEW TILTING TELESCOPIC UPRIGHTS, Transtacker makes load spotting easier and faster . . . and cradles the load for maximum protection to operator and merchandise. Manual handling is replaced by simple push-button moving and easy finger-tip operation of the lift and tilt controls . . . all electrically!

Light weight for use in buildings of limited floor and elevator capacities, with low initial cost, NEW TILTING TYPE TRANSTACKER is available in two models . . . single-lift and telescopic, with a single lift of 64 inches and a telescopic lift of 120 inches.

Both units are engineered to permit passage through seven-foot doors, and full use of otherwise unused storage facilities.

With the telescopic model, finger-tip control lifts a 28-inch, 3100-pound load, a 36-inch, 2600-pound load, or a 48-inch, 2100-pound load in a matter of seconds, thanks to Automatic's exclusive high pressure hydraulics. Performing at top efficiency on standard batteries and chargers, interchangeable with Automatic Transporters, battery charging cost is as little as 11c a day, and maintenance costs surprisingly low.

Find out now, the big competitive advantage Transtacker can give your business because of its original low investment and proved ability to cut handling costs. Mail coupon.

Transtacker
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
DIV. OF THE YALE & TOWNE MFG. CO.
39 West 87th Street, Dept. B-9, Chicago 20, Illinois

Please send me catalog and complete facts on new, low-priced TILTING TYPE TRANSTACKER.

Company Name.....
By.....*Position*.....
Street Address.....
City.....*Zone*.....*State*.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

X MARKS THE SPOTS
where these handy BENCH GRINDERS
SAVE YOU TIME AND MONEY!
It's a smart plant layout that spots Van Dorn 6" Standard Bench Grinders within easy reach of workers . . . for faster tool sharpening that helps machine tools operate at peak efficiency! With plenty of Bench Grinders available, your workers won't have to waste time making long trips from their machines to the grinder and waiting in line to use it . . . won't put off sharpening tools because of the inconvenience!
These sturdy, well-balanced Bench Grinders also do many types of grinding and metal removing, polish and buff plated surfaces; remove rust and clean parts. They're economical to buy and economical to operate; packed with plus-value features: well-built constant speed 1/4 H.P. motors, easily adjusted tool rests, full-sized bearings on rotor and wheel spindles, covered by protective sleeves. Ask your nearby Van Dorn Distributor for a demonstration Write for free catalog to: The Van Dorn Electric Tool Co., 719 Joppa Road, Towson 4, Md.
For Power Specify
"Van Dorn"
(DIV. OF BLACK & DECKER MFG. CO.)
PORTABLE ELECTRIC TOOLS
VAN DORN
6" STANDARD
Bench Grinder
ONLY $38.00
A price that makes it easy to buy several!

How Pittsburgh Color Dynamics Contributes to Protection of Your Food and Beverages

Use of *Energy in Color* Improves Production of Bottle Caps, Seals and Filling Machinery, Says Crown Cork & Seal Company's Chief Engineer

THESE DAYS . . . the alert manufacturer considers carefully every development—no matter how new or unusual—which will help him to build more and better goods at lower cost.

COLOR DYNAMICS is winning increasing approval among industrial executives in many fields because it has proved that its use improves both efficiency and well-being of workers.

Characteristic of the comments on this new painting method is the following letter from R. B. Hoffmeister, Chief Industrial Engineer of The Crown Cork & Seal Company of Baltimore, Maryland. This organization is one of the largest producers in the world of bottle crowns for beverages, metal milk bottle caps, closures for food, cosmetics and pharmaceuticals, and the equipment for filling these containers.

"We recently constructed a new one-story daylight building to house our Machinery Division," writes Mr. Hoffmeister.

"In this plant we have gone one hundred per cent for COLOR DYNAMICS. This color scheme has not only been applied to the machine section but has also been carried out in offices, engineering department, cafeteria, locker and wash rooms.

"No more drab gray or dark blue machines, no more glaring white walls—only restful colors. The workmen are proud of their surroundings and take great pains to keep their equipment and surroundings clean. We have also noted decided betterment in the quality and quantity of production, in morale and in safety. We are completely convinced that color has found its place in industry."

Why not test the value of Pittsburgh COLOR DYNAMICS in your plant? Try it on a machine or two. Better still, try it in one department. See the difference it makes in the efficiency, morale and safety of your employees. We'll be glad to make a COLOR DYNAMICS survey of your property on request without obligation on your part.

Paint RIGHT with Color Dynamics
Paint BEST with Pittsburgh Paint!

The benefits of COLOR DYNAMICS are made more enduring when you use Pittsburgh's long-lasting high-quality paints for every need.

WALLHIDE—available in four types: **FLAT**—a velvet-like finish that is beautiful and restful; **SEMI-GLOSS**—with higher sheen; **GLOSS**—with enamel-like sheen; **PBX**—extra-durable finish can be washed frequently.

LAVAX PBX ENAMEL—for woodwork, furniture or metal trim. Brushes out freely and easily to a smooth, satin finish.

FLORHIDE—for floor surfaces. Quick-drying, tough, can be scrubbed with soap solutions.

LAVAX MACHINERY ENAMEL—a durable finish impervious to grease, grime or dirt.

SEND FOR A COPY OF THIS BOOK!

● Our booklet—"COLOR DYNAMICS IN INDUSTRY"—explains this new painting system and how you can use it in your plant. Mail this coupon for your FREE copy.

Pittsburgh Plate Glass Co., Paint Div., Department PM-29, Pittsburgh 22, Pa.

Name_____

Street_____

City_____ State_____

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

NEW ENGLAND MUTUAL LIFE

holds down overhead costs with

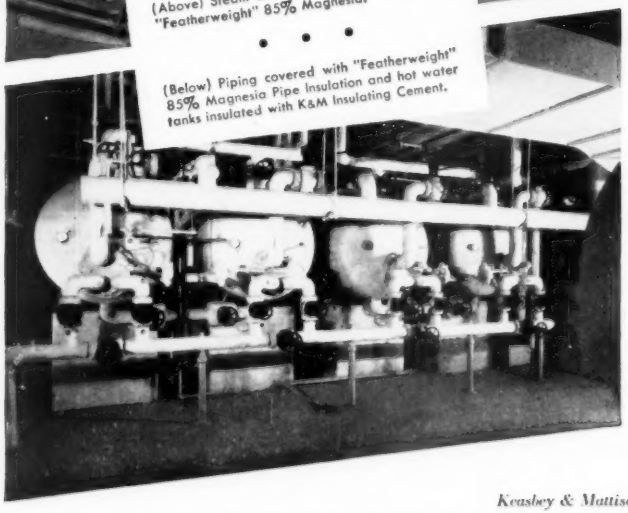
Home Office of New England Mutual Life Insurance Company, Boston, Massachusetts.

K&M "FEATHERWEIGHT" 85% MAGNESIA INSULATION

(Above) Steam lines are insulated with K&M "Featherweight" 85% Magnesia.

• • •

(Below) Piping covered with "Featherweight" 85% Magnesia Pipe Insulation and hot water tanks insulated with K&M Insulating Cement.



This imposing home office of the New England Mutual Life Insurance Company, Boston, is supplied with heat from a central heating plant.

The steam pipes are insulated with K&M "Featherweight" 85% Magnesia with the net result that heat losses are reduced to a minimum.

"Featherweight" 85% Magnesia insulation, first manufactured by K&M 62 years ago, combines the high insulating properties of basic Carbonate of Magnesia with Asbestos Fibre as a binding agent, forming a featherlight, fireproof, efficient insulating material.

K&M Distributors, located strategically throughout the country, are experts on the application of K&M insulation materials . . . and can point the way to savings for you. Write us for further information.

K&M best in asbestos

Nature made Asbestos . . .

Keasbey & Mattison Company has made it serve mankind since 1873.

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

"Hearing is Believing"

THAT AMERICAN PHILLIPS SCREWS

Cut Costs···Kite Sales

...when you listen to makers of Electronic Products like these:

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

HOW THEY CUT COSTS: Says one hearing-aid manufacturer, "American Phillips Screws save us as much as 50% in time alone — and what they've saved us by banishing spoilage runs into even *more* money!" Simply because American Phillips Screws can't slip, can't slash, *can't drive any way but straight.* And because they're so much easier to handle, aim, and drive . . . without "dropsy."

HOW THEY KITE SALES: American Phillips Screws give all types of products a smart new look . . . a strikingly improved appearance over ugly, burred, slotted screws. And when you really *merchandise* their better holding power and greater vibration-resistance —which add up to fewer servicing needs — you've got an earful that drives home more sales. Find out what American Phillips Screws can do for *your* product. Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

NOW...
DRIVE PROVED
MADE WITH RAYTEX FORTIFIED RAYON
Strong, continuous filament rayon specially processed to eliminate stretch...Impregnated with live rubber for high flex strength and long life.
MINIMUM STRETCH • GREATER FLEX STRENGTH • LONGER V-BELT LIFE

Only Dayton V-Belts are DRIVE PROVED for the Job

HEAVY-DUTY DRIVES

The Dayton Thorobred, standard of industry. Bends without straining or heating. Always runs true, flexes freely around the pulley without squashing. Equally efficient on V-Flat drives. Matched in sets for multiple drives.

LIGHT-DUTY DRIVES

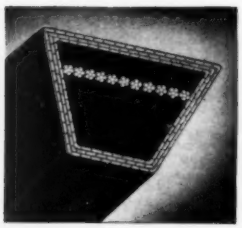
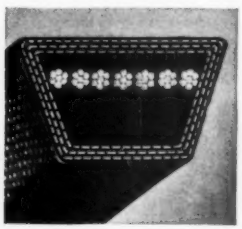
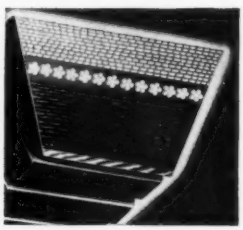
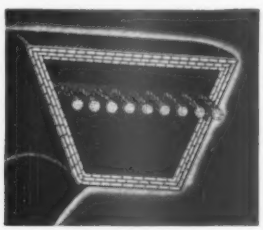
The Dayton FHP V-Belt, for fractional horsepower motors on small machines and appliances. Especially designed for quiet, vibrationless performance. Exceptionally strong. Will not twist, squash, or stretch.

SMALLER PULLEY DIAMETERS

The Dayton Cog-Belt, the most flexible V-Belt made. Permits use of 25% smaller pulley diameters and shortest centers for greater saving of space. The built-in Cogs eliminate bumping, jarring or inching.

HIGH-SPEED DRIVES

Dayton Steel Cable V-Belts for extreme load conditions. Fine gauge, heat-treated steel strands, cabled for extra strength. Evenly spaced and absolutely parallel. Available in patented Cog, or standard V design.

Dayton V-Belts

..as near as your telephone

A new V-Belt service by Dayton, to save you time and money three ways:

1. "Drive Proved" V-Belts

To give you the right belt... drive proved to your particular drive. For Dayton has made more than 100 million V-Belts. They have been drive proved in every kind of industry, under every possible operating condition of heat, cold, dirt, dust and oil. They have proved their ability to save space; to provide positive power; start and stop smoother; run quietly, without vibration and last longer than any ordinary belt.

2. As near as your telephone

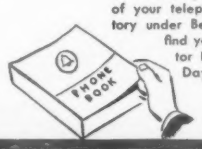
There is a Dayton V-Belt Distributor near you. He is equipped with the specialized knowledge to recommend the right drive to serve you most efficiently. If it's an unusual application, he has the resources of the entire Dayton organization to call on. You'll find him listed in the classified section of your telephone directory or his representative is now calling at your plant.

3. Instant maintenance service

Your Dayton Distributor maintains complete stocks of Dayton "Drive Proved" V-Belts and Pulleys. He is prepared to give you instant service for existing or future drives, and to provide you with an immediate source of mill supplies.

Put this new service to work in your plant now. Equip your drives with Dayton "Drive Proved" V-Belts and be sure you are getting the maximum in drive performance and service. Call your Dayton V-Belt Distributor today. *The Dayton Rubber Company, Dayton, Ohio.*

IT'S EASY TO BUY DRIVE PROVED **DAYTON V-BELTS**



Look in the yellow pages of your telephone directory under Belting. You'll find your distributor listed under Dayton V-Belts.

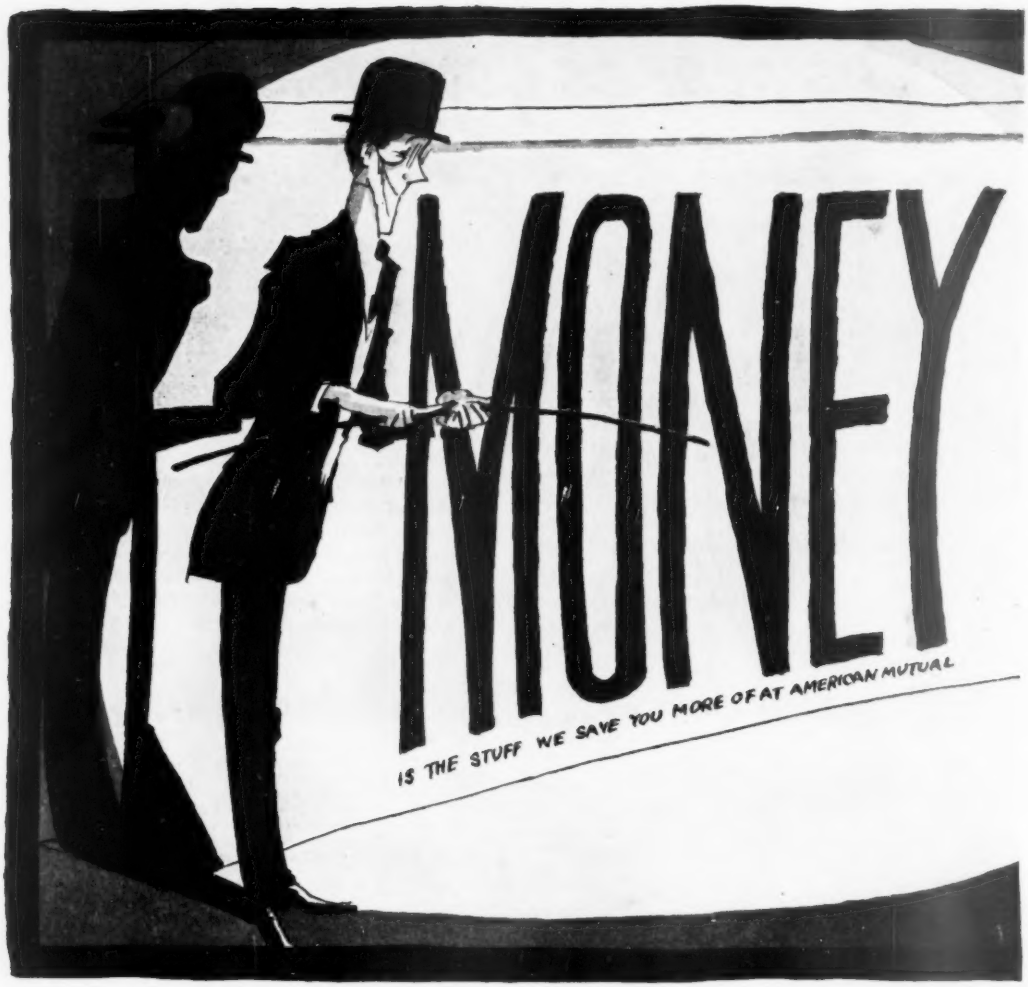
Phone him. He has the specialized knowledge to recommend the right "Drive Proved" Dayton V-Belt for your particular drive.

He maintains complete stocks of Dayton V-Belts and Pulleys for your needs. Assures you that your drives will always perform with top efficiency.

Dayton Rubber

IF YOU CAN READ THE

(YOU'LL BE INTERESTED IN THIS AD)



THE one thing most businessmen don't like about insurance *is having to pay for it!*

Now, we can't do away with payments but we can make those unpleasant premiums smaller and smaller and smaller (enough smallers!)

For instance: We helped an aircraft manufacturer to reduce his premium rates from 13.6% above the average for the field to actually *24.5%* less than the average!

We helped a dredging company reduce their premium rates to 53% below the average for the field!

And so on and so on . . .We can show you dozens of cases where Dat Ole Debbil, Premium was cut down to size . . .

That's part of our I. E. Loss Control Service.* We help you reduce accident hazards and you don't pay as much for protection.

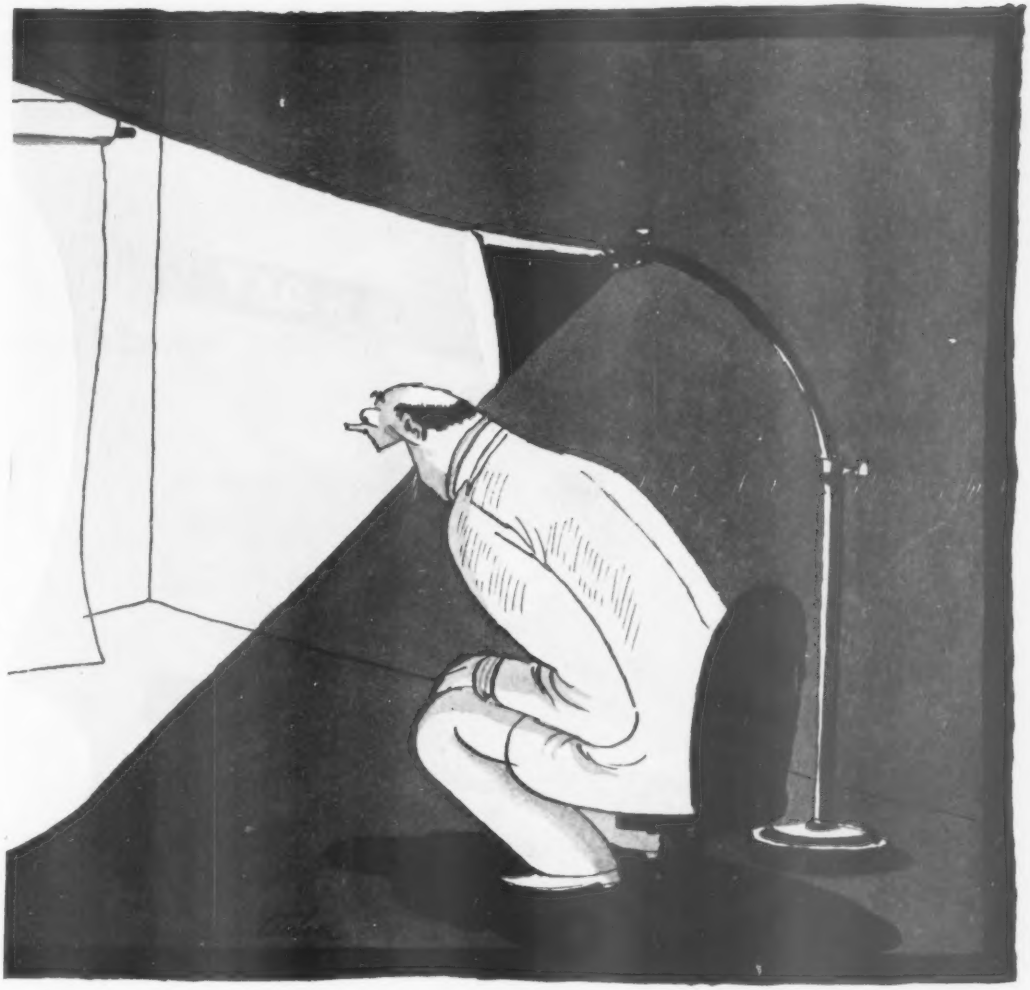
So you pocket the money . . . and you buy yourself a yacht and a good cigar!

While we're helping reduce accidents and premiums, we show you ways to increase production and efficiency . . . (We can prove it with more than 40 convincing cases!)

AMERICAN MUTUAL... *the first American liability insurance company*

© 1949 AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

FIRST LINE . . . by Mr. Friendly



So you make more money . . . Have another yacht on us!

And all this service is included at no extra charge with every industrial policy . . . Doesn't cost you a single solitary, lonely, wistful cent extra!

But hold your breath! Here's the best part . . .

Despite rising costs (which you may have heard about), we still give you the chance to save 20% through dividends! . . . 20 cents on every insurance dollar.

That's money, mazuma, wampum, do-re-mi, sheckels, the green folding stuff . . .

That's what we save you more of at American Mutual!

•

**Accident prevention based on principles of industrial engineering*

MAIL THIS COUPON NOW

Dept. F-22, American Mutual Liability Insurance Company
142 Berkeley Street, Boston 16, Massachusetts

Without obligation, please *rush* me my *free* copy of *The All-American Plan*, showing me how to save as much as 20% on practically every kind of insurance, except life. Also, a most helpful, free, illustrated 98-page book, *Foremanship and Accident Prevention in Industry*.

*Name*_____

*Street*_____

*City*_____ *State*_____

More Labor-Aiding and

On steel fabrication job

PAID FOR ITSELF—IN ½ DAY

On furniture manufacturing job

PAID FOR ITSELF—IN **12 DAYS**

On fleet maintenance job

PAID FOR ITSELF—IN **26 DAYS**

These examples show the time in which typical I-R AIR POWER EQUIPMENT paid for itself in actual use because AIR TOOLS enable the workman to produce more with less effort.

Time-Saving Equipment

is the answer to Lower Production Costs

equipment helps the

workman produce More with Less effort

Time and cost studies also prove this significant fact: Ingersoll-Rand Air Power equipment which, a few years ago, saved enough to pay for itself in 30 days, now pays for itself in only 18 days on the same operations under today's conditions.

To find out what this can mean to you, here is all you do . . .

Call your I-R branch office. Ask for an engineer who will work with your department heads in making a job study of your production operations. He will help you make actual Air Tool performance tests right on your own jobs in your plant. Then you can determine definitely how much you can save in production costs by using Compressed Air and Air Tools. You will know how soon the recommended equipment will pay for itself.

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

321-B

It STAYS CLEANER LONGER....

See why the

C-W SEALEDPOWER

TOTALLY-ENCLOSED....FAN-COOLED MOTOR

SAVES 80% OF MAINTENANCE COSTS

COMPARE CLEANING COSTS!

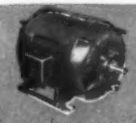
	Conventional* Fan-Cooled Motor	VS	C-W Sealedpower Motor
	Normal (Not Extra Dirty) Service		
FREQUENCY	**EVERY YEAR** a conventional fan-cooled motor requires cleaning, in the opinion of experienced maintenance chiefs.		**ONCE EVERY 3 YEARS** is often enough for a Sealedpower motor, according to those who have had experience with it.
OPERATIONS REQUIRED	**17 OPERATIONS**—to shut down, dismantle, clean and reassemble motor. Motor must be shut down and taken out of production, for about 3 hours.		**NO NEED TO SHUT DOWN** in normal—not extra dirty—duty, no need to remove fan cowl, etc. Brushing cowl end, and cleaning outside of motor is sufficient.
TIME, LABOR COSTS	**$4.95** **3 HOURS** time, estimated by motor maintenance men, at union scale of $1.65 per hour, totals $4.95 yearly per motor, in normal service.		**14c** **¼ HOUR** time, once every 3 years, cleans a Sealedpower motor. At $1.65 per hour, cleaning cost per year is only 14¢.
COSTS IN ABNORMAL SERVICE	**EVERY 3 MONTHS,** a conventional motor, operating where dirt or lint is excessive, should be cleaned. That requires 18 hrs. of labor at $1.65, for a total cleaning cost of $29.70 per motor, during an interval of 18 months.		**ONLY ONE** cleaning every 18 months keeps a Sealedpower motor running cool and efficiently. Only ¾ hour to remove fan cowl, brush fan and outside of motor and replace cowl. A labor cost of only $1.24 per motor.

**A totally-enclosed, fan-cooled motor, of conventional design, was used for comparison*

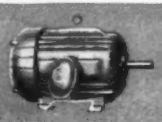
You get this *dollar-saving design* only when you specify C-W Sealedpower Motors. No other totally-enclosed, fan-cooled motor has exterior cooling, with the fan-driven airstream blowing over the finned frame, carrying dust and fumes *outside* and *away*. It beats rust and corrosion, too, because the frame is rugged *cast iron*.

RATINGS FROM 3 TO 60 HP, horizontal or vertical, with NEMA "C" or "D" flange mountings. Many ratings are stocked . . . see C-W's weekly Stock Sheet. Talk over your motor needs with a Crocker-Wheeler representative.

FOR ANY APPLICATION WHERE EXCESSIVE MAINTENANCE IS INDICATED —specify SEALEDPOWER and SAVE



Protected-Type Motors



Sealedpower Motors

Wound Rotor Motors

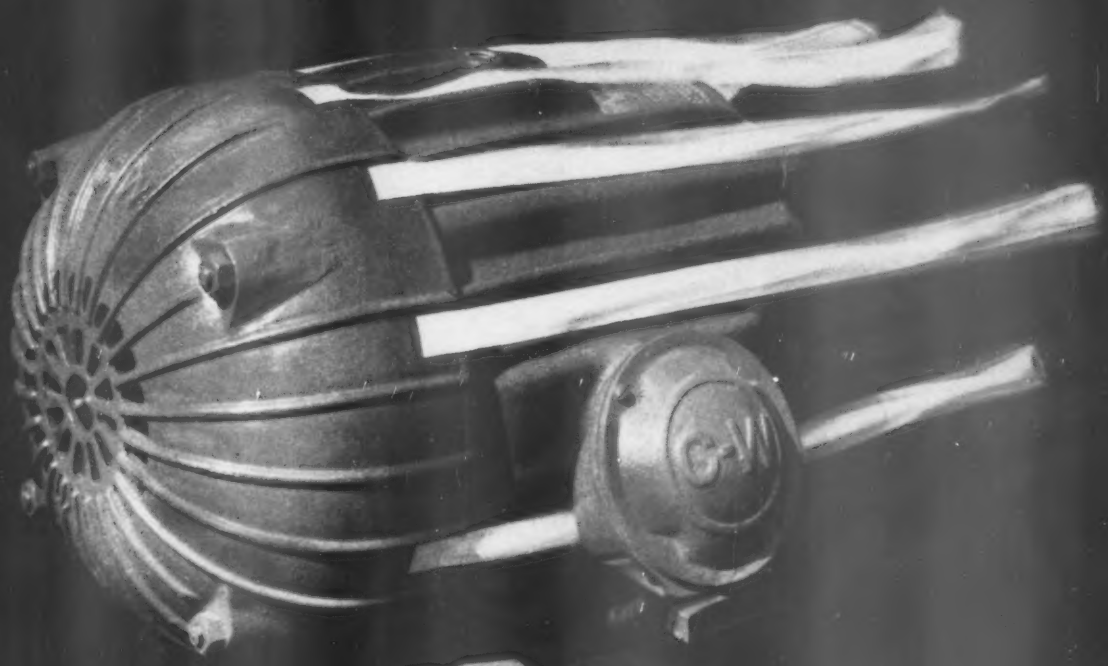
Direct Current Motors

Generators

Flexible Couplings

It SKIPS SHUTDOWNS

150% MORE COOLING SURFACE
is provided by the radiating fins, exclusive with the C-W SEALEDPOWER. Here, fluttering streamers trace the fan-driven airstream that blows dust and fumes outside and away.



CROCKER WHEELER
ELECTRIC MANUFACTURING COMPANY, AMPERE 3, N. J.
A Division of The Joshua Hendy Corporation

Branch Offices:
Boston, Buffalo, Chicago, Cincinnati, Cleveland, Los Angeles, Milwaukee, New York, Philadelphia, San Francisco, Pittsburgh, Washington, D. C.—Representatives in principal cities.

Before You Buy ANY totally-enclosed motor, be sure to read why SEALEDPOWER will prove a "maintenance miser" for you. This new booklet, "It's Different—it's a Dollar-saver," is packed with facts no savings-minded motor user can afford to overlook. Write for it.

Crocker-Wheeler Electric Mfg. Co.
Ampere 3, N. J.

Send the SEALEDPOWER Motor Booklet, "It's Different—it's a Dollar-Saver".
F-249

Name .....

Title or Function .....

Company .....

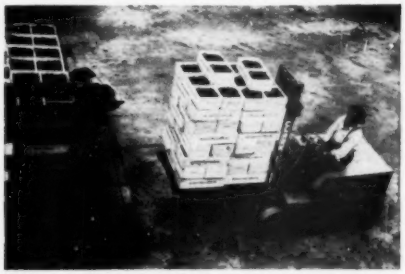
Address .....

HOW BIG WILL YOUR BENEFITS BE?

They save money! That is one of the most potent facts to be crystallized by the collective experience of Clark fork-lift truck users. On the basis of that experience the real question for you is: how big can *your* benefits be?

In every conceivable kind of business that processes, handles, ships, stores or carries materials, the Clark Method is Industry's first choice by a wide margin.

By speeding materials movement, it increases capacity to produce. By utilizing air rights, it expands warehouse capacity without expanding the warehouse. By faster loading and unloading, it reduces demurrage charges. Accidents are reduced. Damage losses approach the vanishing point.



50 lugs of cherries assembled on a skid on their way to the cannery—an easy load for the Clark electric battery-powered Carloader.

To tell and illustrate how businesses like yours are "cashing in with Clark's" is the function of "Materials Handling News." This unique magazine enjoys the largest circulation of any periodical concerned wholly with modern materials handling methods. A recent issue is of special value in that it "takes the Clark fork-lift truck apart"—to *show where and why it is a superior machine;* and why its users find that it is their best buy—that its proved quality makes it most economical to operate and to maintain.

A scoop attachment has many uses in handling bulk material. Here a Clark fork-lift truck with a scoop is shoveling corn into a conveyer that takes it to processing.

It is our pleasure to send this magazine to any business man who wants to read it. It will be mailed upon request—and will prove an effective "cost-less" way to CONSULT CLARK.

Bulky items like this box strapped for export are handled quickly and safely by the Clark Yardlift-40, pneumatic tired model designed for negotiating rough surfaces.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY, BATTLE CREEK 41, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

MATERIAL HANDLING *News*

LOOKING AT CLARK

FROM ALL ANGLES

CLARK EQUIPMENT COMPANY, BATTLE CREEK 12, MICH.
☐ PLEASE SEND CURRENT ISSUE MATERIAL HANDLING NEWS
NAME
COMPANY
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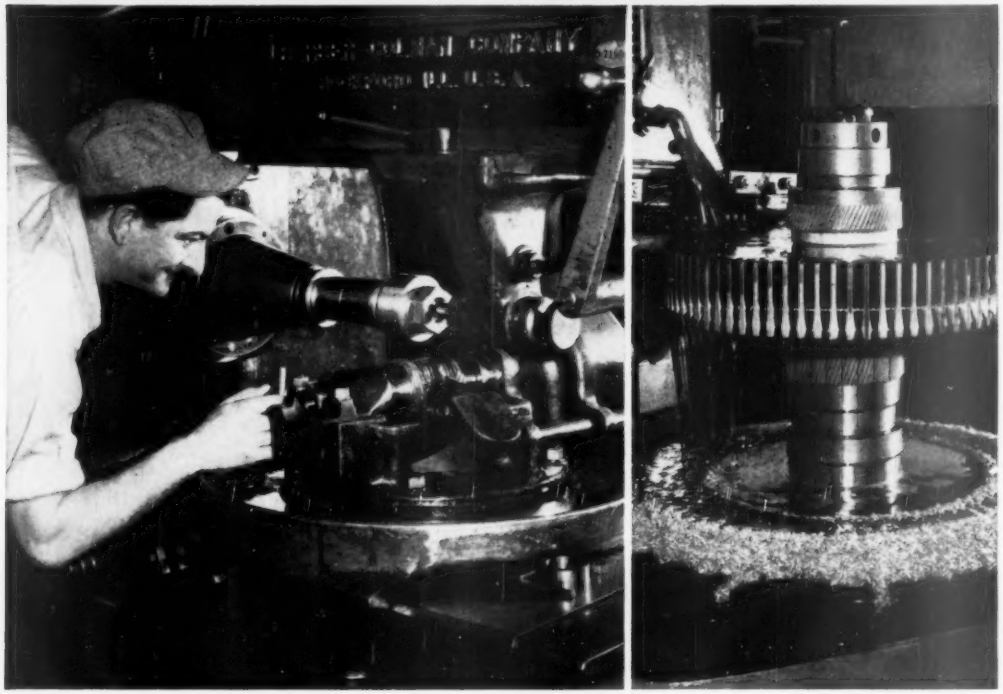
CITY
STATE

Analyze the whole Picture...



When you select Cutting Fluids

IN SELECTING cutting fluids for your machining operations consider your choice from every angle. Will it increase production? Will it lower production costs? Will it improve finish? Will it meet all other requirements peculiar to your operation?

When you look at the whole picture you'll want to investigate the advantages to be gained by specifying the dependable, service-proved cutting fluids of Cities Service. Such products, for example, as Cities Service Chillo Oils which have been performance tested in scores of machine shops.

Why not let a Cities Service cutting oil specialist help you select the best type and grade for your purpose? His recommendations may bring you substantial improvements in the quantity and quality of your production.

Free

Write today for our new and informative booklet entitled "Metal Cutting Fluids". Address Cities Service Oil Co., Room 310, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

KAISER-FRAZER'S

Plant-Wide Sound System

RCA selected to design and install modern plant-wide sound system

When the Kaiser-Frazer Corporation decided to install a plant-wide sound system in their gigantic Willow Run plant, they started the job right by calling in RCA sound technicians.

K-F management knew that the Radio Corporation of America had designed and installed thousands of sound systems that had been "tailored" to meet the particular needs of different types of industries.

There are nearly 600 loudspeakers in the K-F plant-wide sound system. RCA sound technicians surveyed the entire plant, checking the noise level to determine the best type of loudspeakers for each area, based on the amount of noise level at the various points.

The Consolette Control Turret in the foreground provides complete and flexible control of the sound program to any or all parts of the entire plant. Facilities are installed for transcription recording and playback.

Air view of the $100,000,000 Willow Run plant near Detroit, Michigan, where Kaiser-Frazer automobile and Graham-Paige farm equipment is produced. The plant is the largest in the world under one roof.

K-F's news commentator delivers a news broadcast at noon hour to Willow Run's 12,000 employees. Executive paging, special announcements or talks can be transmitted to any or all departments.

K-F's 5200-watt audio output exceeds most commercial broadcasting stations. Shown above is the hub of this immense sound system. It permits high or low level sound to be sent to any of the Willow Run plant's local sound zones.

RCA Sound Systems are flexible and "unit-built" to fit specific applications. Whatever your sound problems may be, RCA engineers are prepared to work out a solution that best meets your type and size of plant. For complete information on RCA Sound Systems, see your nearest RCA Sound Products distributor, or write: RCA Sound Products, Dept. 117-B, RCA, Camden, N. J.

SOUND PRODUCTS

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

Diversify

1 Lifting, stacking Short-haul delivery

2 Quick pick-ups...fast shuttling...anywhere

Buda *Fork Lift Trucks*

Revolutionary new 5000 lb. Buda Fork Lift Truck gives you all the money-saving advantages you've been wanting: 55" free lift for stacking in low ceiling areas . . . 3 speeds forward and reverse to 900 FPM for faster work cycles . . . unobstructed "see-through" vision for increased safety . . . replaceable cylinder sleeves and "quick-change" clutch with bi-metallic facings for reduced maintenance. New 1000 and 2000 lb. Buda models also offer similar advantages for close quarter operations.

Model	Capacity	Height	Width	App. Wt.
F-10	1000 lbs.	60"	28"	2200 lbs.
F-20	2000 lbs.	62"	32"	3000 lbs.
F-50	5000 lbs.	83"	40"	7500 lbs.

NOTE: All units gas powered with heavy-duty industrial-type engines developing maximum travel speeds up to 900 FPM.

Buda *"Chore Boys"*

Versatile Buda "Chore Boys" shuttle bulky, irregularly-shaped loads at speeds to 15 MPH . . . peddle materials, tools and supplies . . . run "rush" errands anytime, anywhere on floors or paved surfaces. *One "Chore Boy" easily moves more, with greater safety, than 3 hand trucks* . . . eliminates waiting time . . . saves confusion and re-handling. Maneuverability in tight spots and narrow aisles saves round-about travel . . . offset seat simplifies handling long pipe, lumber, etc.

Model	Capacity	Deck Area	Width	App. Wt.
B	1000 lbs.	12.8 sq. ft.	37"	800 lbs.
FH	2000 lbs.	20 sq. ft.	40"	1100 lbs.
FF	2000 lbs.	20 sq. ft.	40"	1100 lbs.

Use Model B for small loads, high speed . . . FH for extra capacity plus maneuverability . . . FF for extra traction.

THE BUDA COMPANY, Materials Handling Division, Harvey, Ill.

Rush details on Buda ☐ Fork Lift Trucks ☐ Platform Trucks ☐ Industrial Tractors

I am especially interested in _____ (model) for _____ (application)

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____ CITY _____ ZONE ___ STATE _____

MATERIALS HANDLING man-hour . . . per year!

3 Big volume loads Long-haul delivery

Rx Buda-Hebard "Shop Mules"

Favorites for years in 73 industries, Buda-Hebard "Shop Mule" tractors are still the No. 1 choice for long hauls with trailers. You get plenty of rugged power and traction for lugging heavy loads up steep inclines, or over rough terrain . . . *plus* tough, long-wearing construction . . . interchangeable parts. Choice of 5 basic models with optional tires and attachments lets you handle almost any kind of *towing, pushing, welding, winching, or snow removal job — faster, at less cost.*

Model	HP	Max. DB	Width	App. Wt.
A-21	20	1900 lbs.	40½" to 61"	2150 lbs.
A3V-U2	22	2000 lbs.	40"	2700 lbs.
A14V	30.5	2400 lbs.	42"	3000 lbs.
A3V	30.5	2600 lbs.	40"	3200 lbs.
J-233	56	4500 lbs.	66"	5680 lbs.
"H" Series	68.5	12,000 lbs.	68"—86"	15,500 lbs.

PROGRESSIVE management today realizes that *diversified problems call for diversified equipment,* in order to gain full advantage of mechanized handling, in conserving manpower and reducing non-productive costs.

Diversified Problems

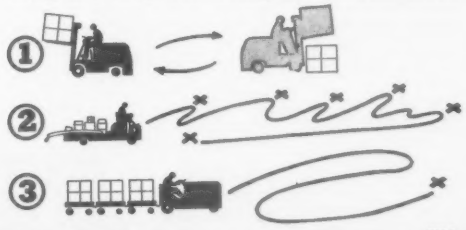
"Why," you ask, "should we run big *lift trucks* all over the plant, when a nimble *platform truck* costs far less for pick-up and shuttle service — and *tractor-trailers* will save money on long hauls?"

And you're right! In many plants it takes all 3 types of equipment to develop maximum efficiency at minimum cost.

Only Buda has "all three"

Today The Buda Company offers you all 3 types — fork lift trucks, platform trucks and industrial tractors — *built and backed by one of the oldest names in industry . . . sold and serviced by experienced materials handling distributors.*

This means that now, for the first time, you can solve your major handling problems with *one contact . . . one manufacturer-distributor responsibility!* It also means that you can depend on helpful, *"unbiased"* planning counsel in selecting the right combination of equipment for your particular handling problems. Mail coupon today for complete information.



BH-5

BUDA

Fork Lift Trucks

Platform Trucks

Industrial Tractors

NEW!

Weld Flux Chipper

CP-455-L with lever throttle and quick release retainer. Push type throttle handles available.

with a high velocity jet blow

This new CP-455 Pneumatic Chipper has a built-in high velocity air jet which cleans off the work surface as though a blow gun were built into the tool.

A new type of non-wearing "Pulley-valve" and throttle regulate the force of the blow from a tap to a heavy hammer-stroke, making the CP-455 an all-purpose scaler. Ideal for chipping weld flux, paint, rust, scale, soot and dirt, and a dozen other applications. Immediate delivery. Write for Bulletin SP-2089.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

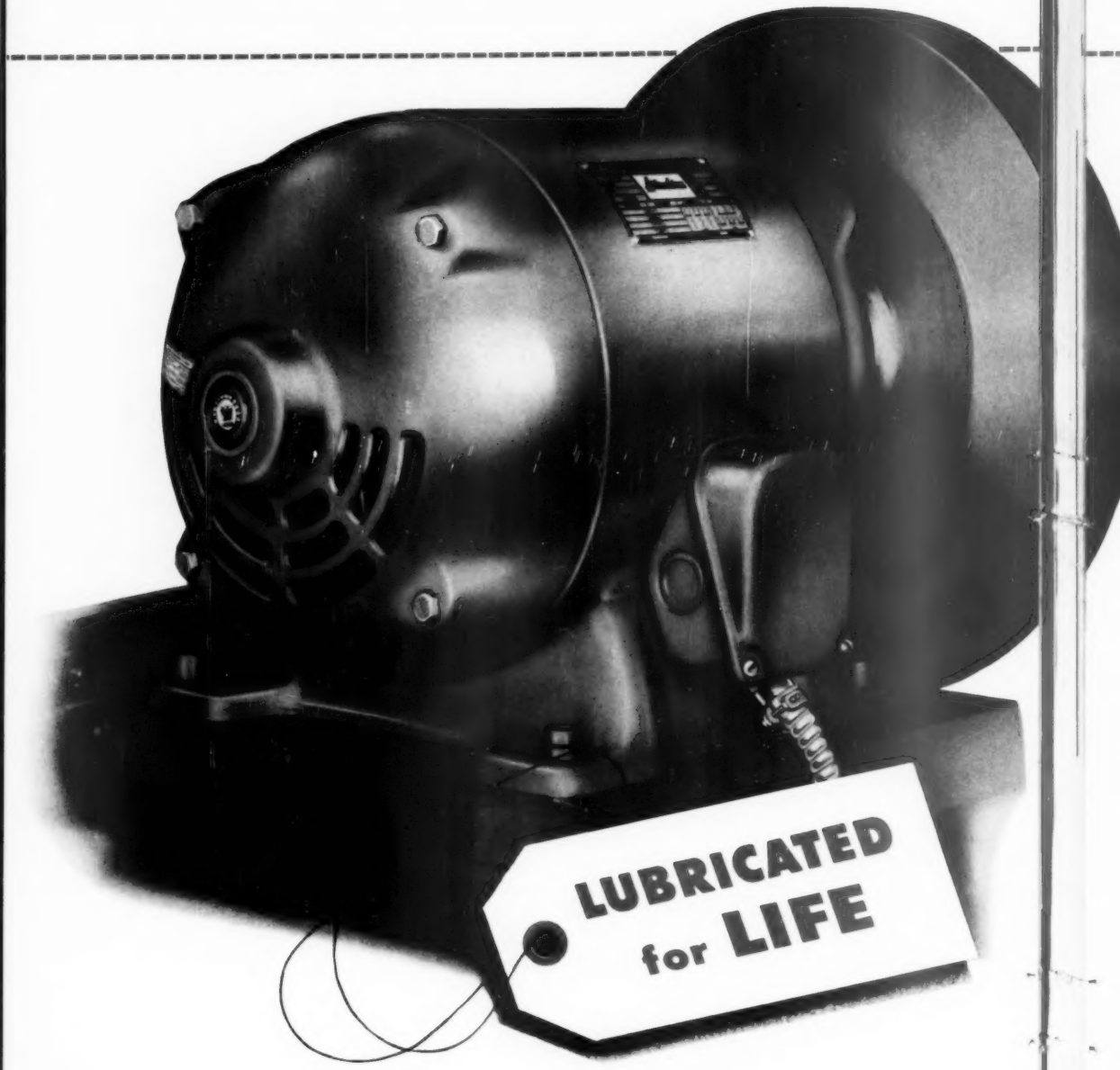
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Life-Line

NOW... LUBRICATED for LIFE

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



do away with lubrication costs

FOREVER

Forget old-time ideas about the care and greasing needed to keep motors running!

Life-Line motors now eliminate the time and cost required for lubrication—for life! Life-Line double-width ball bearings are pre-lubricated with a more-than-ample supply of specially-treated lubricant—and factory-sealed to keep dirt out and grease in, for *the life of the bearing.*

Periodic weekly or monthly greasing schedules can be dispensed with. Motors may be installed in inaccessible locations; machines no longer need be disassembled to reach motors for greasing. Winding failures caused by overlubrication, and failures caused by use of improper lubricants, can be prevented.

Multiply these advantages by the number of motors in *your* plant. You'll find they offer new and important savings—in labor costs, in machine down-time, in motor outage costs. Then get in touch with your nearest Westinghouse office today. Most standard Life-Line motors are now available from stock. Others are available on short delivery schedules. Ask for details on your requirements. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Westinghouse

Life-Line Motors

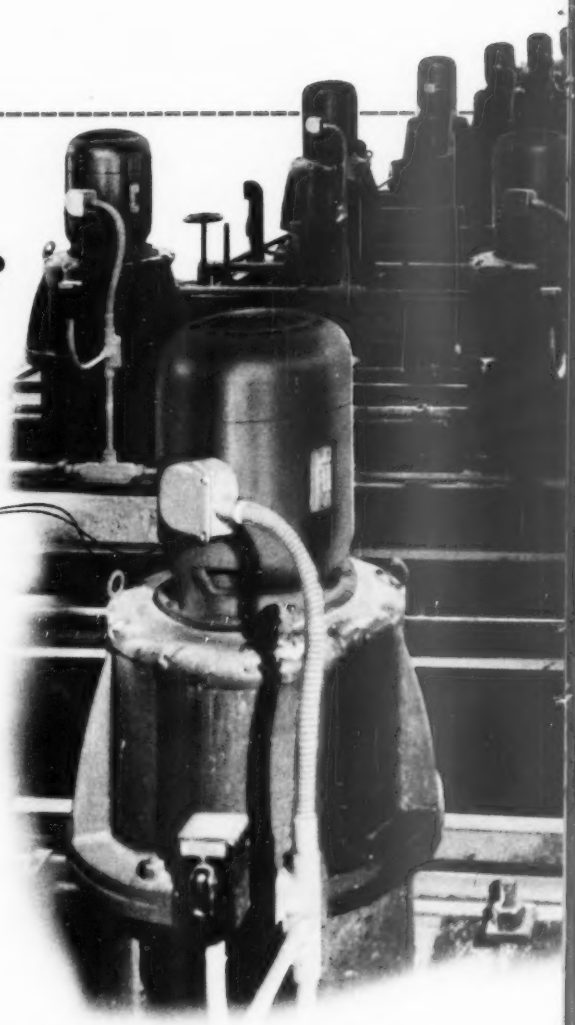
YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Tough lubrication job?

NOT WITH MOTORS

LUBRICATED for LIFE



It costs money to "baby" electric motors with constant greasing attention, whether it's a few or a few hundred.

That's why Life-Line motors offer new and important savings in plants like this one using 119 Life-Line vertical motor drives, and in any others using a-c motors from 1 to 50 horsepower.

Life-Line motors cut down operating costs every day, every week, they are in service, because they need *no* lubrication—*for life.* Sealed, pre-lubricated bearings insure long life—reduce motor outages caused by overlubrication and underlubrication—reduce machine shutdowns and lost production.

Check your Westinghouse representative today for prices and delivery on your requirements. Standard ratings available from stock—others on short delivery. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-21494

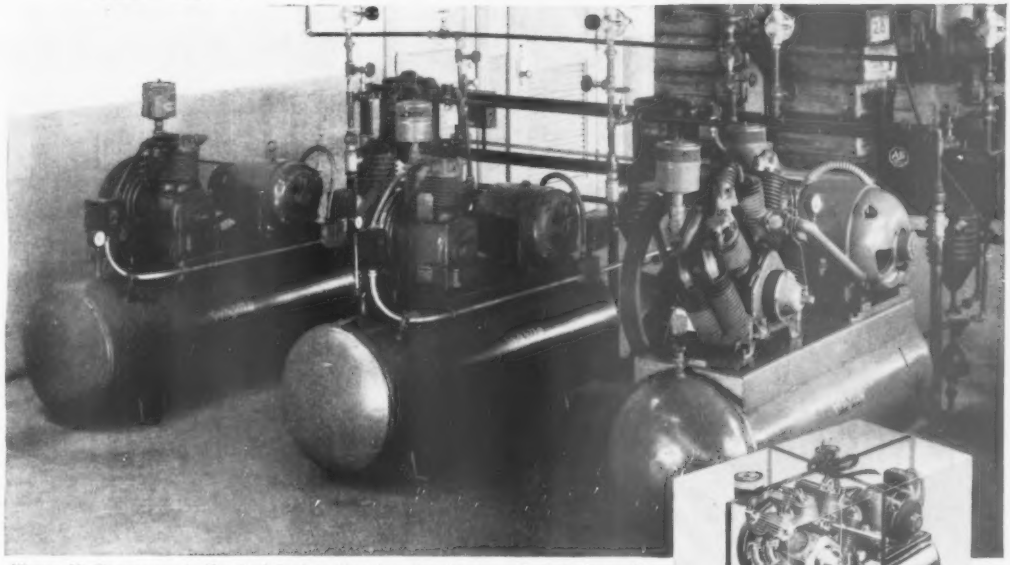
Westinghouse

Life-Line

Motors

Litho in U. S. A.

"NEVER WITHOUT AIR"



Wayne Air Compressors in The Steel Products Manufacturing Company plant, St. Louis, Mo.

Decentralize

AIR SUPPLY FOR SAFETY

INSURE continued production without danger of interruption due to lack of air by departmentalizing air supply in your plant. Install a Wayne in each department using air. These units will pay for themselves quickly, by eliminating wasteful operation of the large central compressor when only one or two departments work overtime.

No time is lost waiting because another department is using air. If air requirements are different in different departments, each Wayne unit can be set to provide the pressure needed. There are many other money saving advantages which a Wayne representative will gladly explain to you. Investigate Wayne Industrial Air Compressors now.

Investigate

THE WAYNE AUXILIARY UNIT PLAN!

WAYNE NATIONWIDE SERVICE

THE WAYNE PUMP COMPANY • FORT WAYNE 4, INDIANA
521 Tecumseh Street

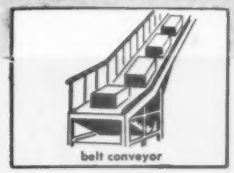
Please tell us more about Wayne Air Compressors and send booklet, "The Wayne Auxiliary Unit Plan." No obligation.

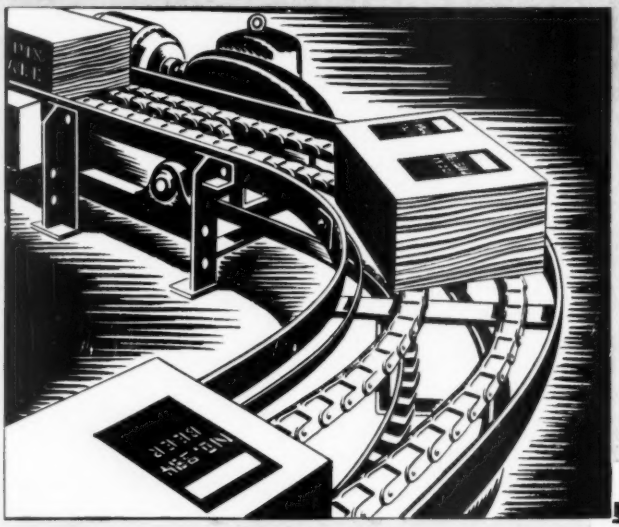
NAME ADDRESS

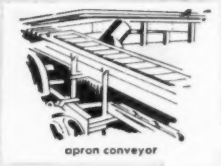
CITY STATE

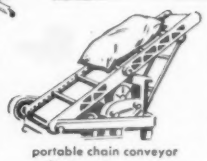
HOISTS • LOADING DOCK LIFTS • HOSE REELS • POWER WASHERS

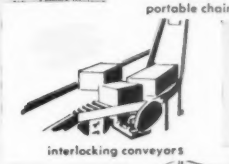
CONVEYORS for aspirin or airframes

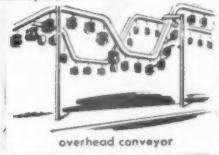

belt conveyor

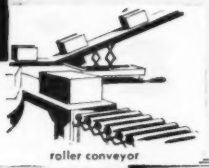

Chain conveyor with G-E electric drive


apron conveyor


portable chain conveyor

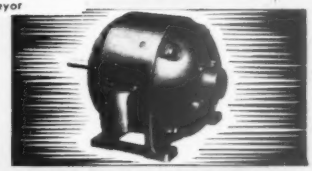

interlocking conveyors


overhead conveyor


roller conveyor

screw conveyor

bucket conveyor

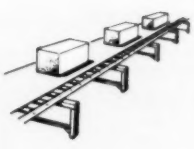

3 GOOD REASONS! Tri-Clad induction motors are protected against physical damage, electrical breakdown, operating wear and tear. Ratings from 1 to 2000 hp.

See General Electric's new MATERIALS HANDLING MOVIE

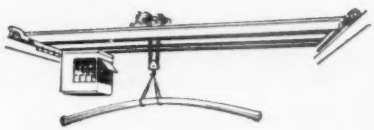
Ask your materials handling equipment supplier or G-E representative to show you "Materials Handling—In Receiving, Warehousing and Shipping"—General Electric's authoritative new movie covering in detail the latest techniques and equipment, without sales bias. When you see the movie, you will receive a copy of the 92-page technical manual which supplements the film. ASK TO SEE THIS PROGRAM NOW!

Everything electrical for MATERIALS HANDLING

CONVEYOR DRIVES



CRANE DRIVES



...POWERED by G.E.

Here's how General Electric's broad experience in engineering conveyor drives can help you cut your over-all handling costs

Among the many services we offer builders and users of materials-handling conveyor systems, two are outstanding.

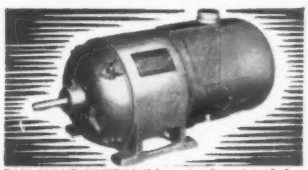
The first is *sound application engineering.* Our materials-handling specialists know conveyor-drive engineering inside and out, having electrified more different types of conveyor systems than any other similar group of engineers.

The second "plus" we offer is one of the largest and most varied arrays of electric motors, controls, and power distribution apparatus available today. Some of them are shown below. Components like these, correctly engineered into a drive will give you a system that is *right* for your needs, today and tomorrow. Consult with your local G-E office before specifying *any* conveyor drive equipment. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

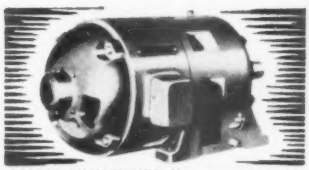
QUICK, SURE STARTS! The new G-E combination starter features a tough "strong-box" magnet coil.

SAFE AND COMPACT! The new G-E a-c starter offers protection for men and machines in one compact unit. Easy to maintain.

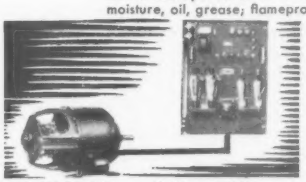
ON-THE-SPOT POWER! Flamenol bus-drop cable is used for 600-volt branch circuits from bus to conveyor motors. Resists damage from moisture, oil, grease; flameproof, too.



DIAL YOUR SPEED! With a simple twist of the dial, a G-E Type ACA motor gives you stepless speed adjustment over speed ranges of 3 to 1, 6 to 1, or 20 to 1. Ratings from 3 to 75 hp.



GEARED 'WAY DOWN! You can get a wide choice of speed reduction in a G-E gear motor . . . down to a few rpm. Ratings from fractional horsepower to 50 hp.

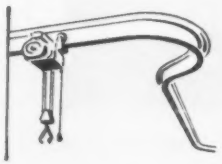


20 TO 1! G-E Thy-mo-trol drive provides speed ranges as high as 20 to 1 from a-c power. Speed adjustment is smooth and stepless. Ratings available from ⅛ to 25 hp.

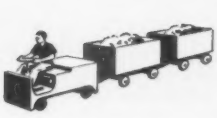
GENERAL ELECTRIC

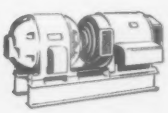
660-70

HOIST DRIVES



INDUSTRIAL TRUCK DRIVES & BATTERY CHARGERS





Wet mopped 6 times and it's still shining!

THE REASON—it's waxed with Johnson's Brown Label No-Buff Floor Finish!

When your floors are waxed with Johnson's Brown Label, *they stay waxed and bright through heavy traffic and wet mopping!* Floors retain 90% of their original gloss after as many as 6 wet moppings. Think what this means from a maintenance angle—easier cleaning, less time, less waxing, greater economy in maintenance labor . . . maintenance dollars. Put your floors on the Johnson Brown Label basis *now*. Use the coupon below to send in your order or have a J-Man demonstrate the amazing shine qualities and wear resistance of Johnson's Brown Label.

Try this easier way to clean—wax—maintain your rubber and asphalt tile floors

CLEAN

Mop on solution of Johnson's Floor Cleaner to soften all old wax films and dirt for easy removal.

SCRUB

After Cleaner has worked for 2 or 3 minutes, scrub thoroughly with electric scrubbing machine to break up old films.

RINSE

Remove all Cleaner solution, wax and dirt from floor by mopping with clear water rinses. Allow floor to dry completely before waxing.

WAX

With mop or applier spread on full, even coat Johnson's Brown Label No-Buff Floor Finish and let dry. For maximum luster and slip resistance, apply 2nd coat same as 1st.

S. C. Johnson & Son, Inc., Maintenance Wax Dept.
1526 Howe Street, Racine, Wisconsin

- ☐ Ship 5 gal. can Johnson's Brown Label No-Buff at $2.75 per gal.
- ☐ Ship 5 gal. can Johnson's Floor Cleaner at $2.35 per gal.
- ☐ Have your J-Man call
- ☐ Send Free Floor Care Manual

Name _____

Title _____

Establishment _____

Address _____

City _____ *State* _____

S. C. Johnson & Son, Inc.
Racine, Wisconsin

•

Makers of
JOHNSON'S WAX

▶▶THE FASTEST THING IN FASTENINGS◀◀

WHY WELD, CLINCH OR STAKE NUTS?

JUST SNAP IN *Speed Grips*®

Now you can attach square nuts to metal parts *by hand!* Just thumb pressure snaps the *new* SPEED GRIP Nut Retainers in place. SPEED GRIPS, like many SPEED NUTS, have spring steel "mechanical hands" that lock them in bolt-receiving position. They are ideal for blind assembly attachments because SPEED GRIPS do not have to be held with a wrench.

Developed as a companion item to the famous Tinnerman SPEED NUTS, the SPEED GRIP Nut Retainer gives all the self-retaining advantages of SPEED NUTS in applications requiring square nut attachments.

Write for the details on this latest Tinnerman development. The savings it can make in equipment investment in assembly steps, in material handling and in parts costs will surprise you. And ask your Tinnerman representative about our Fastening Analysis Service. Tinnerman Products, Inc., Cleveland 13, Ohio.

In Canada: Dominion Fasteners Limited, Hamilton
In England: Simmonds Aerocessories, Ltd., Treforest
In France: Aerocessoires Simmonds, S. A., Paris

New Tinnerman SPEED GRIPS are available in a complete range of sizes. Screw size and panel range are stamped on each fastener.

Here's how SPEED GRIPS can be applied to panels on the moving assembly line. In a few seconds, assembler can snap in self-aligning SPEED GRIPS . . . no extra handling . . . no special equipment required!

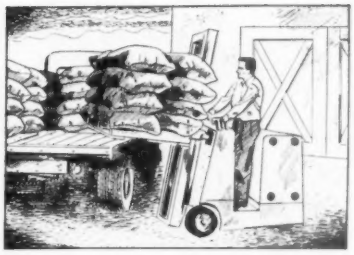
TINNERMAN *Speed Nuts*®

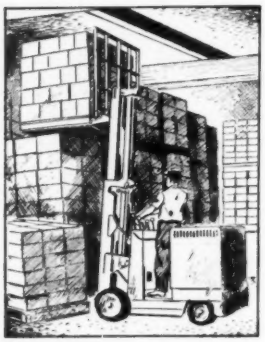
®Trade Mark Reg. U.S. Pat. Off.

MORE THAN 4000 SHAPES AND SIZES

Battery-Powered INDUSTRIAL TRUCKS where UNIT-LOAD SAVINGS are greatest

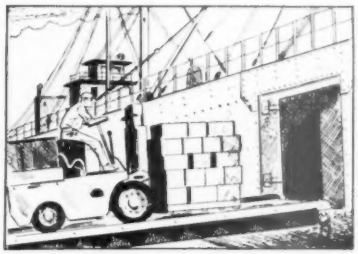
95.6% SAVINGS IN MAN-HOURS for a pharmaceutical manufacturer in unloading a highway-truck and placing bags in storage. This operation previously took three men 4½ hours. Supplier of bagged raw material was asked to ship in unit loads. Now one man and an *electric* industrial truck do the job in 12 minutes, safely and without risk of contamination.





UNIT LOADS SAVE BUILDING NEW WAREHOUSE for food distributor. High-lift electric trucks store a wide variety of palletized products *clear to ceiling.* Actually reduce, by two-thirds, the time formerly needed for stacking. *Battery-powered* trucks handle *more* material *faster*—assure clean, fume-free handling without fire hazard.

210 MANUAL HANDLINGS BECOME 3 WITH UNIT LOADS. A steamship line needed 210 handlings to load one cargo item. Now with *electric* industrial trucks and unit loads the same job takes *3 handlings.* Battery-power dependability in tough stop-and-go service further reduces loading time, increases number of sailings—cuts costs to shipper and consignees.



Unit-load handling cuts your costs *before* materials and products reach you. Unit-load handling *in* your plant and *from* your plant reduces prices you and your consignees must charge.

Your suppliers can pack to your specification. It is to their advantage and to your advantage to pack in unit loads. Unit-load handling through your own operations and to your customers gives you important savings and competitive advantages.

With battery-powered industrial trucks, you get unit-load handling most dependably, most efficiently . . . *at lowest cost per ton handled.* That's why you'll find *many* more electric trucks than all other kinds in the service of America's cost-conscious industries.

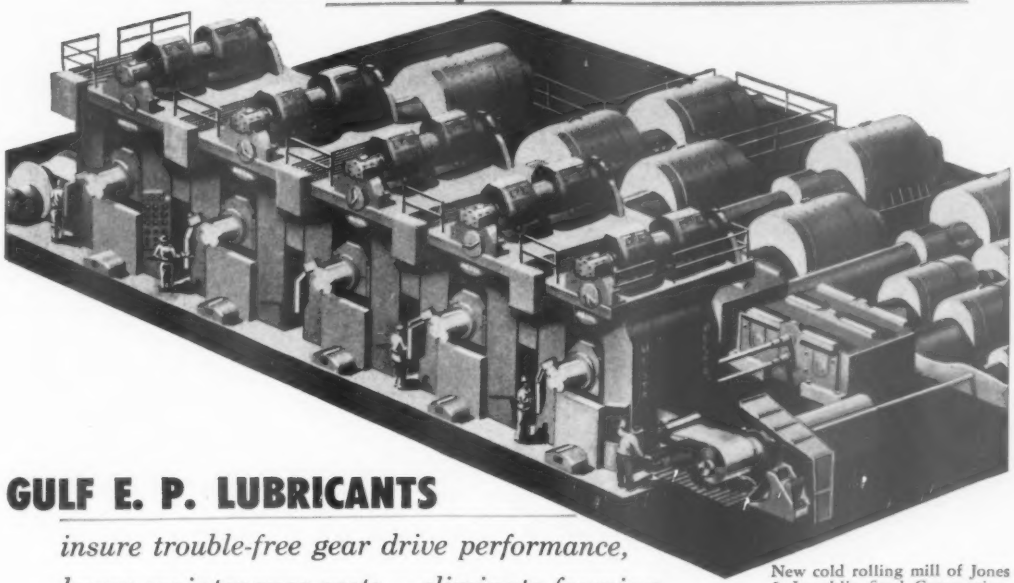
THE ELECTRIC INDUSTRIAL TRUCK ASSOCIATION

29-28F Forty-first Avenue, Queens Plaza, Long Island City 1, N. Y.

For information on unit-load handling with electric industrial trucks, taken from the actual experience of users, write today for your free copy of the MATERIAL-HANDLING HANDBOOK.

One of the many ways that

industry makes multiple savings with Gulf Quality Oils and Greases:



GULF E. P. LUBRICANTS

insure trouble-free gear drive performance, lower maintenance costs — eliminate foaming.

New cold rolling mill of Jones & Laughlin Steel Corporation, Aliquippa Works. Note comparative size of mill and five men in the picture.

High production in industry today often calls for excessive loads on gear drives. To provide the desired factor of safety, lubricants with extra load-carrying capacity are desirable.

Gulf E. P. Lubricants have been widely adopted by industry for such heavy duty work. These specially compounded lubricants are engineered to withstand the shock loads and high pressures experienced in the most severe service, to help insure smoother gear drive performance and lower maintenance costs.

Gulf E. P. Lubricants are used, for example, to protect the gear drives, pinions and screw down mechanisms of the world's fastest 5-stand cold rolling mill, an artist's drawing of which is shown above. This outstanding mill cost $13,000,000, rolls strip for tin plate products at speeds as high as 6250 feet per minute.

Gulf E. P. Lubricants and the more than 400 other Gulf quality oils and greases are helping plant operating men make multiple savings through improved production and lower costs. Make sure your plant is getting the advantage of all recent developments in petroleum science. Write, wire, or phone your nearest Gulf office today and ask a Gulf Lubrication Engineer to call.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

MOBILIFT'S OPERATING SPEED PUTS HANDLING COSTS "ON ICE"!

In the materials handling field speed is not a matter of "miles per hour" but "tons per day" of materials handled.

Mobilift is designed to speed up materials handling in warehouses and production plants. Its size and shorter turning radius enables it to operate easily in crowded areas. Its gasoline engine assures full-time, heavy-duty service. The fact that it has no gears to shift speeds operation—insures more trips per hour—more tonnage per day—less cost per ton.

Mobilift's tremendous savings are helping thousands of executives to lower their "break even point" and to increase their net profits. Many have even junked expensive handling equipment to take advantage of Mobilift operation.

Sign the coupon below and let us show you how the Mighty Midget can put handling costs "on ice."

MOBILIFT CORPORATION
835 S.E. Main St., Portland 14, Oregon

Please send me your illustrated folder on Mobilift operation.

Name _____

Firm _____

Address _____

City _____ State _____

MOBILIFT
"The MIGHTY MIDGET"

DISTRICT SALES OFFICES

NEW YORK
CHICAGO
SAN FRANCISCO
LOS ANGELES
ATLANTA
DALLAS

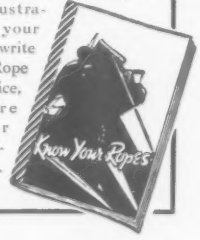
Here we see an 8" piece of rope wire being twisted on its own axis. The revolutions necessary to break the wire are counted and only those coils are accepted which test at least 10% above American Petroleum Institute specifications for wire rope. In addition to being an indication for toughness, the torsion test reveals whether the wire is free from steel defects such as seams and cups.

A routine test? Yes, but with higher standards. And every coil of wire on both ends must pass this and countless other tough tests before acceptance for use in making Wickwire Rope. It's these tests, coupled with over 125 years of wire-working know-how, that are your assurance of the utmost in performance, safety and long rope life when you use Wickwire Rope.

Wickwire Distributors and Wire Rope engineers throughout the country are ready to help solve your wire rope problems, and to provide prompt delivery of the rope you need from strategically located warehouse stocks. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed.

THIS 82-PAGE BOOK ON WIRE ROPE IS FREE. WRITE FOR YOUR COPY TODAY!

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write —Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.



WICKWIRE ROPE

CF&I & SUBSIDIARIES

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Fort Worth • Houston • New York • Philadelphia • Tulsa

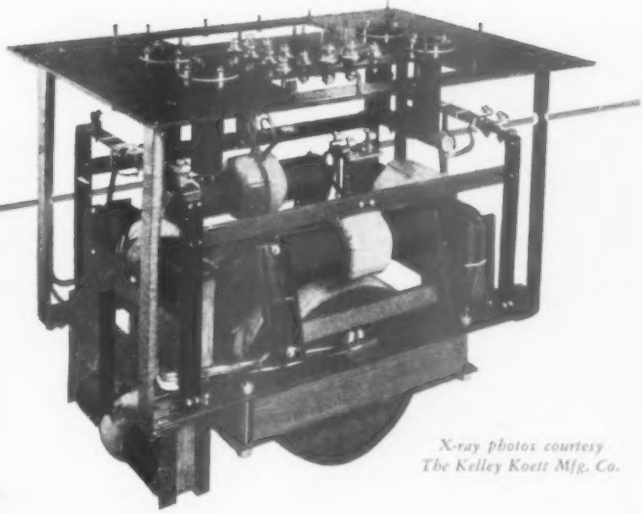
PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

Why Pay This Unnecessary Expense in these Days of Rising Costs?

Unlike your other rising costs of production (in payrolls, machines and raw materials) the soaring cost of eye accidents is one expense you *can definitely do something about.* You can "roll back" this unnecessary cost 98% because eye accidents are preventable when shop workers wear safety goggles. The average cost of goggles is about $1.50 — even the *slightest* eye accidents they prevent average over $15.00. Your nearest AO Safety Representative can show you case histories of plants similar to yours where an adequate eye protection program has been *eye-opening* in costs saved!

American Optical Company — *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



X-ray photos courtesy The Kelley Koett Mfg. Co.

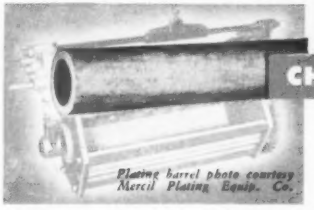
FORMICA TUBING - -

Lifeline for Cost-Conscious Executives . . .

PHYSICAL

M-R-C bearing photo courtesy Marlin-Rockwell Corp.

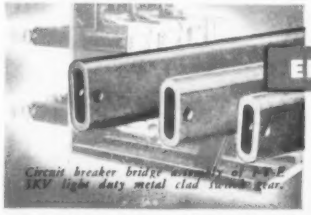
Ball bearing retainer rings for all industry call for Formica's superior physical properties.



CHEMICAL

Plating barrel photo courtesy Mercil Plating Equip. Co.

Formica's excellent for electroplating barrels and other applications requiring high resistance to chemicals.



ELECTRICAL

Circuit breaker bridge assembly of 2.4 KV light duty metal clad switch gear.

Bus Bar insulation, one of many Formica applications in electrical fields.

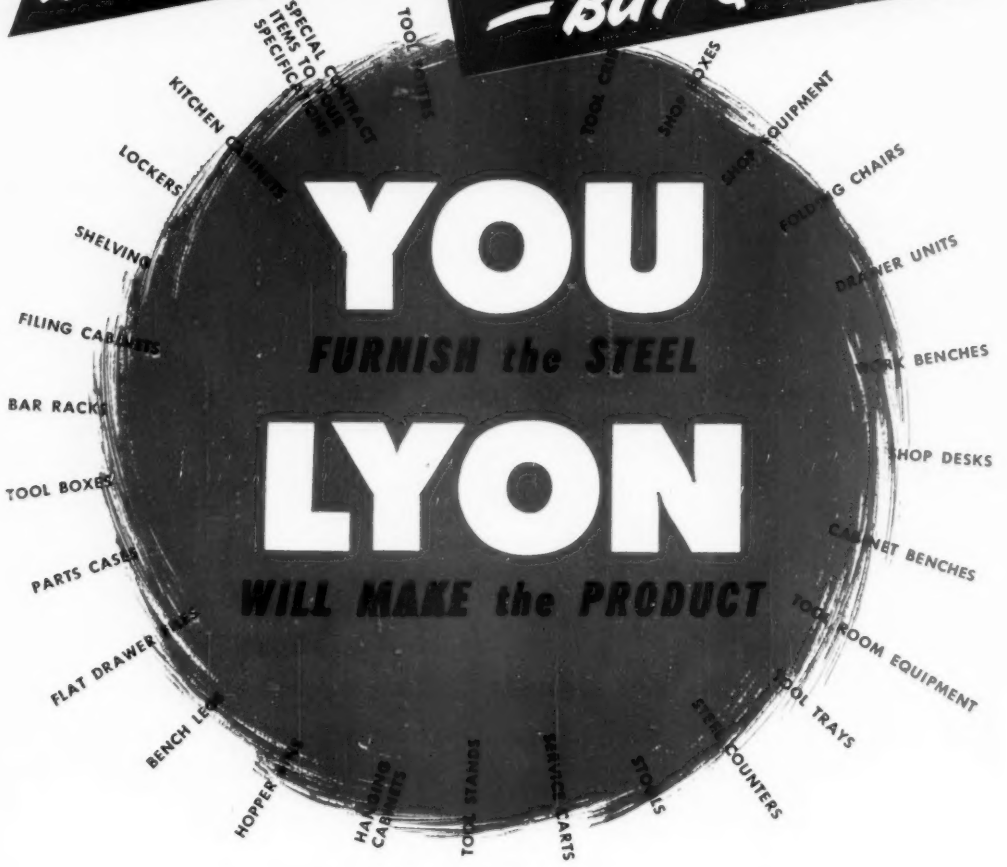
The X-ray machine you see is but one example of Formica's incomparable quality at comparable cost. In this case, it's Formica Tubing, used for insulating the powerful 125,000-volt transformer.

Formica also comes in special molded shapes, rods and sheets (note frame supports in transformer above). It can be machined, punched, turned, milled, drilled, threaded, stamped and postformed. There's a variety of grades, each high in electrical, physical, or chemical properties, whichever is most desirable. There's a grade for your need, whatever it may be. Why not let *our engineers* work with *your engineers?*

Write today! FORMICA
4665 Spring Grove Ave., Cincinnati 32, O.

Productive FORMICA at Work in Industry

WHAT DO YOU NEED? —BUT QUICK!



● We buy the steel from you and ship the pound-for-pound equivalent in any selection of LYON products, at regular published prices (see partial list below) or special assemblies, sub-assemblies, parts, etc., for your products—to your specifications.

For complete information about the "customer steel plan" get in touch with your nearest LYON District Office.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 212 Monroe Avenue, Aurora, Illinois
Branches and Dealers in All Principal Cities

A PARTIAL LIST OF LYON PRODUCTS

- Shelving
- Lockers
- Wood Working Benches
- Economy Locker Racks
- Kitchen Cabinets
- Display Equipment
- Hanging Cabinets
- Welding Benches
- Filing Cabinets
- Cabinet Benches
- Folding Chairs
- Drawing Tables
- Storage Cabinets
- Bench Drawers
- Work Benches
- Drawer Units
- Conveyors
- Shop Boxes
- Bar Racks
- Bin Units
- Tool Stands
- Service Carts
- Hopper Bins
- Parts Cases
- Flat Drawer Files
- Tool Trays
- Desks
- Stools
- Tool Boxes
- Sorting Files
- Ironing Tables

HOW TO REDUCE COSTS ON POWER TRANSMISSION

● If you are interested in transmitting power at lower cost, you will be interested in the design and performance of Foote Bros. Hypower Enclosed Worm Gear Drives. Both in design and manufacture, these units represent a new approach to the transmitting of loads. They incorporate greatly improved gearing made possible by a revolutionary new technique in generating gears. An air channel cylinder gives increased thermal capacity, and mechanical capacity has been increased by better metallurgical control of materials.

All these developments, plus improved methods of manufacture, add up to a unit that is smaller in size—lighter in weight—a unit that will save you money in both original and operating cost.

Foote Bros. Hypower Enclosed Gear Drives are made in horizontal and vertical types in a wide variety of sizes and ratios. Write for full information on the Hypower drives, or check with your Foote Bros. representative on any power transmission problem you may face involving any type of gearing or enclosed gear drive.

FOOTE BROS. HYPOWER ENCLOSED GEAR DRIVES

INCREASE LOAD CARRYING CAPACITY
A revolutionary new technique in generating gears gives greatly increased load carrying capacity.

INCREASED THERMAL CAPACITY
One of the features contributing to the increased thermal capacity of these units is an air channel cylinder through which is drawn a stream of air at high velocity. This channel is immersed in an oil bath and has internal fins.

REDUCTION IN SIZE AND WEIGHT
New design and improved methods of manufacture make possible a much smaller reducer and effect a major saving in weight.

BETTER METALLURGICAL CONTROL
Increased mechanical capacity is achieved through improved metallurgical and foundry techniques starting with chemical analysis of virgin metal alloys and carrying this development through to improved production methods.

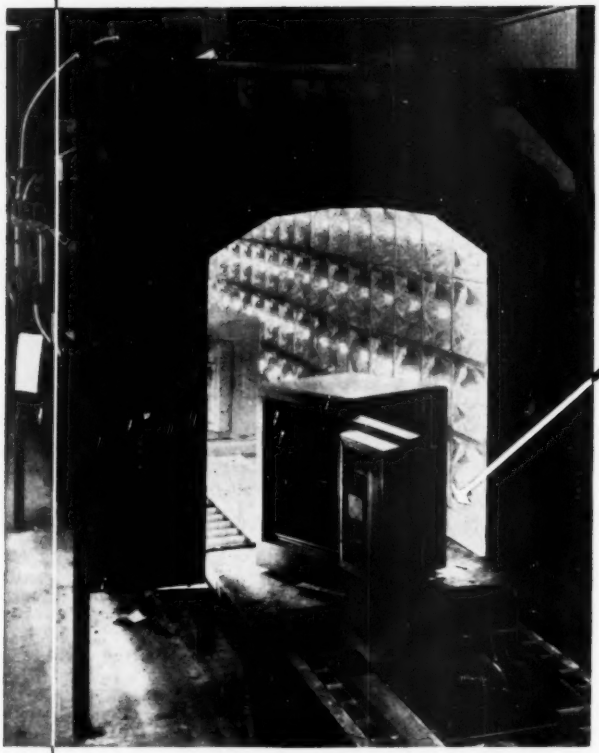
SEND FOR BULLETIN
Bulletin HPA gives complete information, dimension and rating tables and selection data on Foote Bros. Hypower Enclosed Worm Gear Drives. A copy will be sent on request.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. I, 4545 South Western Boulevard • Chicago 9, Illinois

THROUGHOUT INDUSTRY–IT'S FOSTORIA EVENRAY
HIGHEST EFFICIENCY IN
INFRA-RED EQUIPMENT



A TYPICAL FOSTORIA EVENRAY OVEN INSTALLATION — This Fostoria Evenray System at Herring-Hall-Marvin Safe Co., Hamilton, Ohio, bakes enamel on various sizes of safes in 12 to 15 minutes. Lacquer is forced dried on some safes in the same oven in 6 minutes.

SAVES
TIME • SPACE • COST
FOR FINISH
BAKING
and Many Heating
Operations

Properly engineered, Infra-red is the most efficient of all heating systems for finish baking and many other heating operations. Fostoria Evenray Systems out-perform any other Infra-red equipment on the market today. The experience of over 6,000 installations — the outstanding ability and leadership of Fostoria Infra-red engineers — the foremost research and knowledge of Infra-red applications — are combined in Fostoria Evenray Systems. It pays to use Infra-red — and Infra-red pays *best* with the sound engineering of a Fostoria Evenray System. Request a Fostoria recommendation, today.

WRITE
today, for free brochure describing the Infra-red process and Evenray advantages. Tell us your particular problem for our recommendation. No obligation.

EVENRAY SYSTEM
fostoria
FOR BAKING • DRYING •
PREHEATING • DEHYDRATING

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO
Oldest and Largest Manufacturers of Industrial Infra-red Ovens

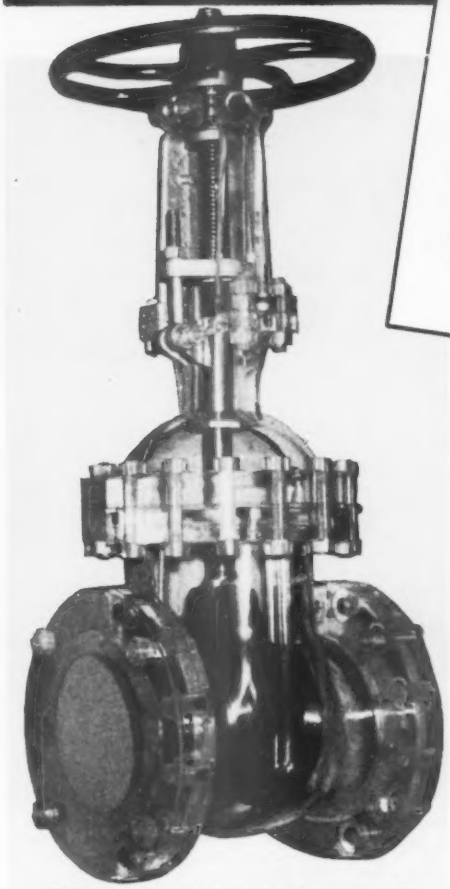
EXPERIENCE COUNTS—

Over 6,000 Plants Now Bake And Dry With Fostoria Evenray Systems

- Lowest Unit Operating Cost
- Most Uniform Coverage
- Maximum Temperature Range
- Maximum Energy Utilization
- Greatest Flexibility
- Approved Electrical Construction — Listed under Re-examination Service of Underwriters' Laboratories, Inc.

THE *Inside Story* OF

OIC
PACE-SETTER
IN VALVES



OIC'S FAMOUS PLASTIC TRANSPARENT VALVE has traveled the country from one exhibition to another showing plant engineers everywhere the exclusive advantages of the long OIC line of superior valves. This plastic valve lets you *see* how OIC Valves work—why they operate easier and quicker . . . why OIC Valves wear less and require less maintenance. This plastic Valve lets you see why OIC *Sets the Pace in Valves!*

CAREFULLY selected trim alloys for greater utility and durability. • Extra-deep stuffing box for a more efficient, longer lasting seal. • Long condensing chamber beneath stuffing box to protect the packing from excessive heat. • Precisely calculated flange dimensions, bolting requirements, and gaskets for a superior construction at these critical points. • End-seated type seat rings for a positive, leak-proof closure. • Straight-through ports to minimize turbulence and maintain peak pressure. • Sturdy I-beam wedge is guided by integrally-cast body ribs interlocked with long machined slots on each side of the wedge. This feature insures true alignment and reduces vibration during opening and closing.

O-149-25

SEND FOR THE OIC CROSS REFERENCE CHART.
You'll find that your change-over problems are gone forever. Simply check the number of the valve on the line that you wish to replace, find it in the chart, and you will find the corresponding OIC Valve for the job. Write for your chart to The Ohio Injector Company, Wadsworth, Ohio.

OIC VALVES
STEEL • IRON • BRONZE

Taking the bite out of weather

Koppers Bituplastic* Protective Coating does not "alligator." This is a major improvement over many types of coatings commonly used to protect exposed metal, concrete and masonry from the ravages of weather.

For when a protective coating "alligators" . . . breaks down into those unsightly cracks like the scales on an alligator's back . . . portions of the underlying surface are frequently exposed, and protective efficiency is lowered.

Koppers Bituplastic guards against that. It's also waterproof, fire-retardant, virtually odorless and tasteless. It withstands extremes of temperature. It's an effective vapor seal over insulation . . . and can be used as a bond between the surface to be insulated and the insulation itself. Koppers Bituplastic completely covers exposed surfaces with a thick, tough, quick-drying coating that provides effective, lasting protection against corrosion and deterioration.

To meet varying corrosive conditions, Koppers makes a complete line of Industrial Protective Coatings. Koppers representatives will gladly recommend the Coatings that will give your plant the best protection—that will hold your maintenance expense to a minimum. Write us, without obligation, for new Protective Coatings Catalog.

*T. M. Reg. U. S. Pat. Off.

Koppers Industrial Coatings are sold through Industrial Distributors

KOPPERS PROTECTIVE COATINGS

KOPPERS COMPANY, INC., Dept. FM-2, Pittsburgh 19, Pa.

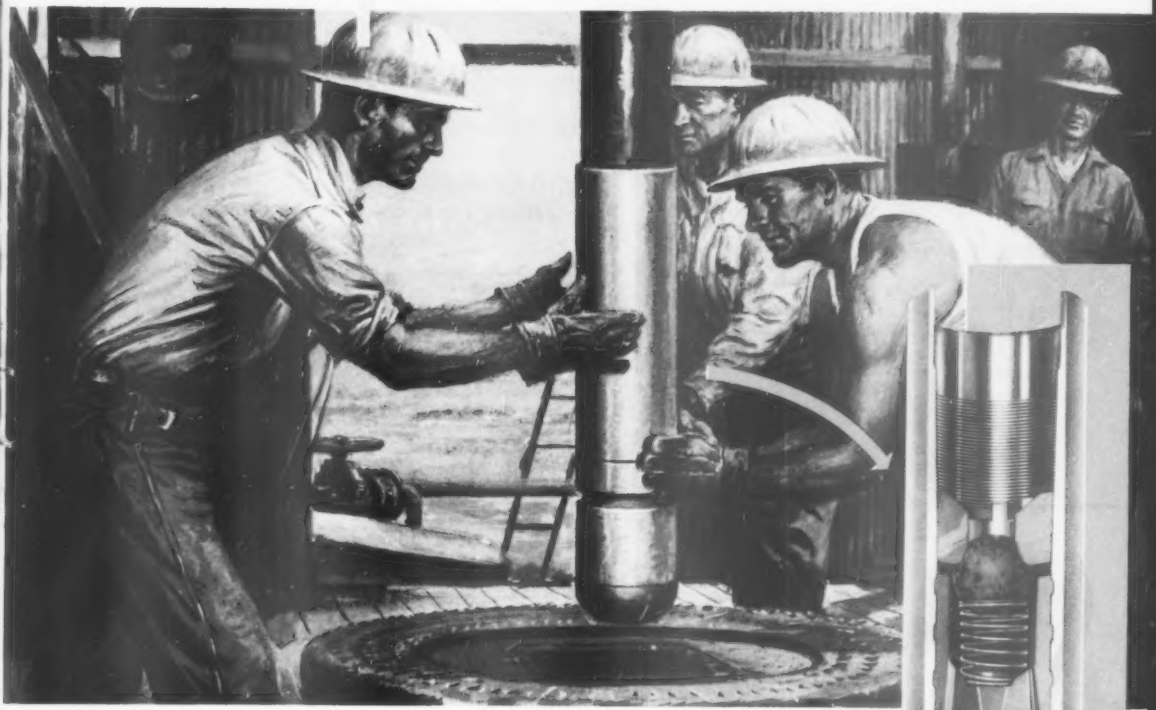
Plastics where plastics belong

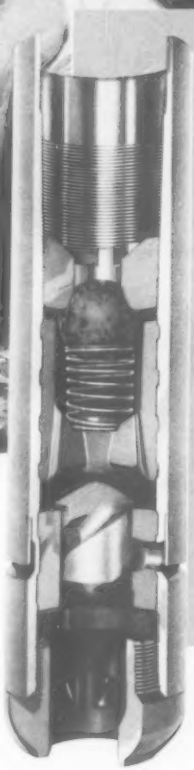
for strength, wear resistance, and ease of machining . . .

Structural strength, wear resistance, and ease of machining are three of Synthane's many properties which, in combination with its other mechanical, chemical and electrical characteristics make it one of industry's valuable materials.

A good electrical insulator, Synthane, the set plastic, is stable over a wide range of temperatures. Hard, dense and durable, it also possesses desirable moisture and corrosion-resistant qualities.

The ability of Synthane to stand up under adverse conditions is interestingly demonstrated by its use in the Turbo-Jet Float Shoe.





Various parts of Float Shoes, used in cementing oil wells, are fabricated from Synthane, for example, the valve ball and thrust plate in the shoe illustrated at the right.

Synthane resists the abrasive action of the liquid cement pumped through the shoe. It is thermosetting, so that it retains its original size and shape, yet is easily drilled out after the cement has set. Thus, Synthane's combination of strength, wear resistance, stability and ease of machining make it a perfect material for this difficult job.

If this brief review of Synthane's unique combination of desirable properties suggests its use in your product, let us help you with design, materials or fabricated parts. Write today for the new Synthane Plastics Catalog, 4 River Road, Oaks, Pennsylvania.

SYNTHANE

where Synthane belongs

SHEETS • RODS • TUBES • FABRICATED PARTS • MOLDED-LAMINATED • MOLDED-MACERATED

PORTRAIT OF A HUNTER

If you are always hunting for a better material, one which combines many valuable physical, chemical and electrical characteristics—consider Synthane laminated plastics.

Synthane has a place in almost every industry because its unusual *combination* of desirable properties can often make a good product or process better.

On a weight-for-strength basis Synthane compares favorably with many metals. It is durable, lightweight, high in tensile, compressive and flexural strengths.

Synthane resists corrosive atmospheres, moisture, oils and solvents. Synthane is also the set plastic, stable over a wide range of temperatures.

Synthane is an excellent insulator —with high dielectric strength, low power factor and low dielectric constant. The ease with which it may be machined adds to its value for practical applications.

Hard and dense, Synthane resists fatigue under repeated impact. Withstands abrasion, does not splinter.

If these properties of Synthane suggest its possible use in your product, let us work with you on materials or fabricated parts. Send Coupon for your copy of the Synthane Plastics Catalog . . . no obligation of course.

FOR MORE ANSWERS ON PLASTICS

SYNTHANE CORPORATION, 4 RIVER ROAD, OAKS, PA.

Gentlemen:

Please send me without obligation a complete catalog of Synthane technical plastics.

Name _____

Company _____

Address _____

City _____ *Zone* _____ *State* _____

SYNTHANE

S

DESIGN • MATERIALS • FABRICATION • SHEETS RODS • TUBES • FABRICATED PARTS • MOLDED-MACERATED • MOLDED-LAMINATED

get the job done *Better* *with* BRADFORD TOOLS

HERE'S more working power for you. Put modern, Bradford Electric Tools into your worker's hands—you'll get better work, faster, and eliminate the costs of inefficient operation.

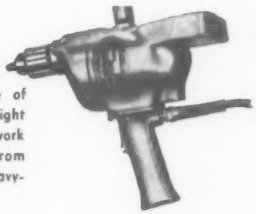
On hundreds of jobs requiring drilling, sanding, sawing, grinding, polishing or buffing, new Bradford Tools are enabling operators to do more work, in less time, with less effort. Take a close look at *your* production and maintenance jobs involving these operations. In each job classification there is a wide range of Bradford Tool models, any one of which may be ideally suited to your requirements. You'll specify Bradford Tools when you check and compare their design, construction, performance and price. For complete information, see your Bradford distributor, or write direct for tool catalog No. 52.

THE BRADFORD MACHINE TOOL CO.
653 Evans St., Cincinnati 4, Ohio

Precision Since 1840

PORTABLE ELECTRIC DRILLS • SAWS • SANDERS • POLISHERS • BENCH AND PEDESTAL GRINDERS • BUFFERS

DRILLS



A complete line of powerful, lightweight drills for every work requirement. From 1/4" to 1" Heavy-Duty capacities.

POWER SAWS

No other make of power saw is so accurately balanced. Easy, effortless operation. 6" and 8" Models.

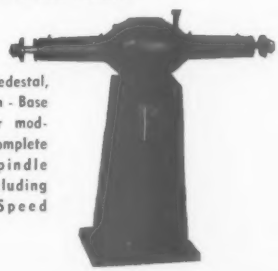
DISC SANDERS AND POLISHERS

New vertical spindle construction reaches difficult places with far greater ease than conventional right-angle types. 7" and 9" Sanders, 10" Polisher.

GRINDERS

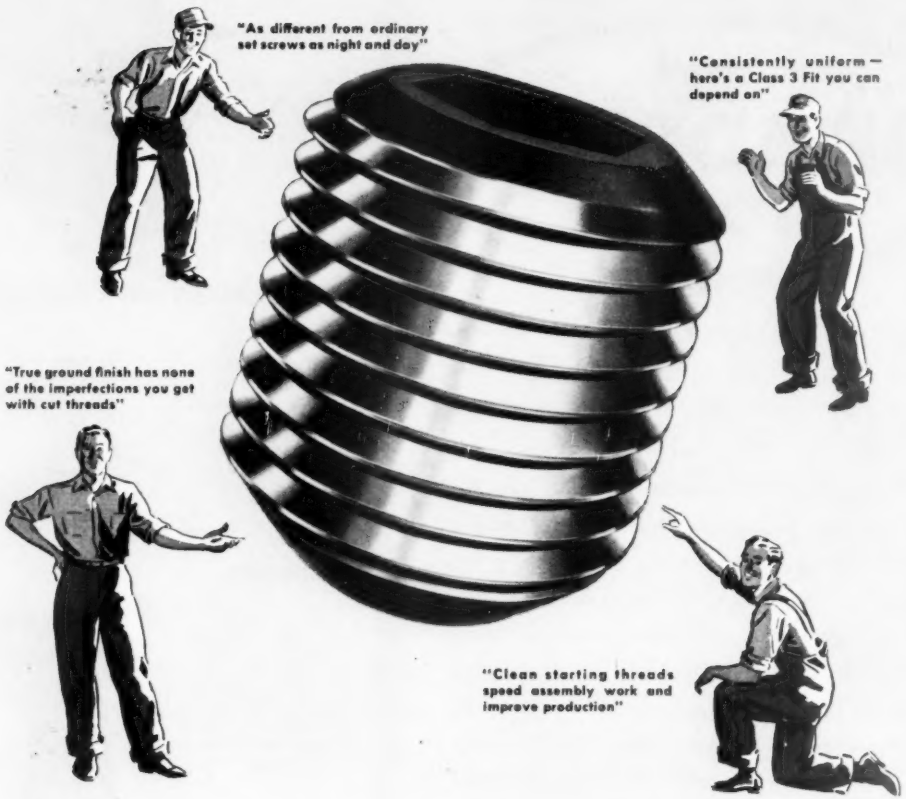
17 Bench and Pedestal models including General Purpose Grinders; Carbide Tool Grinders; Lever Feed Disc Grinders, Variable Speed Snagging Grinders.

BUFFER-POLISHERS



21 Bench, Pedestal, and Motor-In-Base Buffer-Polisher models in a complete range of spindle lengths, including Variable Speed models.

Parker-Kalon GROUND THREAD Socket Set Screws are The TALK of the SHOP!


"As different from ordinary set screws as night and day"
"Consistently uniform — here's a Class 3 Fit you can depend on"
"True ground finish has none of the imperfections you get with cut threads"
"Clean starting threads speed assembly work and improve production"

Compare! Write for Samples!

See why P-K Ground Thread Socket Set Screws speed assemblies, improve strength and safety. Thread grinding, once reserved for screws used in the finest precision equipment, now gives Parker-Kalon Socket Set Screws the accurate finish and faultless contour that mean faster assembly and more sales for your products. Write for samples today.

AVAILABLE FOR PROMPT DELIVERY

PARKER-KALON CORPORATION
200 Varick Street
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SOLD ONLY THROUGH ACCREDITED DISTRIBUTORS

Down time due to FOUL AIR adds more to your costs...

... than the blower that helps men do a fair day's work

Speed fresh, cool air into a furnace, manhole, tank or other confined area where men must work and you'll get faster, better work in return.

There's a portable, easily adaptable Coppus Blower or Exhauster for just about any problem caused by stagnant, hot or fume-filled air. The Blue Ribbon stands for precision engineering that assures peak performance at lowest cost. Check and mail the coupon today for the information that fits your particular problem. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, BEST'S SAFETY DIRECTORY, MINING CATALOGS.

OTHER
COPPUS
"BLUE RIBBON"
PRODUCTS

HORIZONTAL TURBINE
Six frame sizes—
1 to 150 horsepower

VERTICAL TURBINE
Six frame sizes—
1 to 150 horsepower

FANMIX GAS BURNER

FANMIX OIL BURNER

MAIL THIS COUPON To Coppus Engineering Corp., 102 Park Avenue, Worcester 2, Mass.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets; etc., after treated with coating material.

NAME .....

COMPANY .....

ADDRESS .....

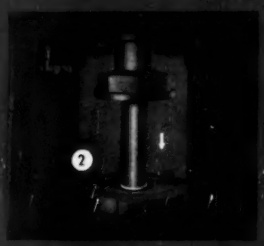
CITY .....

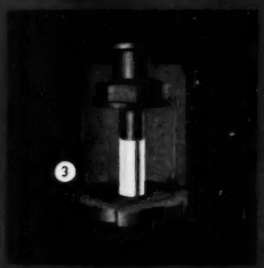
(Write here any special ventilating problem you may have.)

THIS PAGE FOR IMAGINEERS

ALCOA'S IMPACT EXTRUSION PROCESS OFFERS CHALLENGE TO

Improve your product, cut your costs!





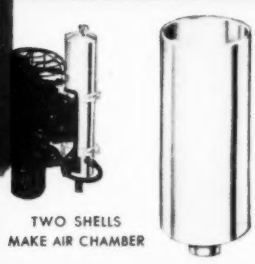
In a fraction of a second, a slug of aluminum becomes a semifinished part, in the Alcoa Impact Extrusion Presses. Here, formed in one swift stroke, can be a housing, or shell, or body, or cylinder; strong, stiff, ready for final assembly operations. A part with sides and bottom integral; as large as 5″ in diameter, 16″ long!

Eliminate expensive, time-consuming operations. Shapes that formerly required assembly of two or more parts are produced at high-production rates. Bosses, lugs, stems, and necks may be formed integrally with the shape, in the same operation.

In one stroke, an Alcoa Impact Extrusion can revolutionize production and assembly of your product; can add beauty of line and form that boost sales. A quick glance at the possibilities shown here should prompt you to write for the new booklet "Alcoa Aluminum Impact Extrusions", or phone your nearest Alcoa sales office. ALUMINUM COMPANY OF AMERICA, 2126 Gulf Building, Pittsburgh 19, Pennsylvania.

SHELL WITH NECK EXTENSION

HEAVY RIBBED HOUSING



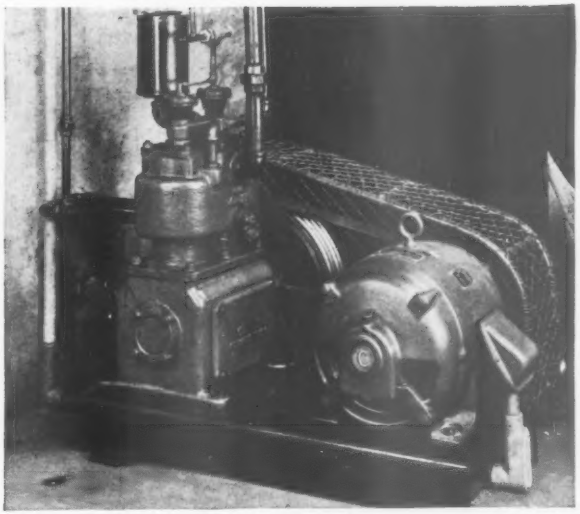
TWO SHELLS MAKE AIR CHAMBER

Write for this 44-page book today! Gives full details.

ALCOA *Aluminum* **IMPACT EXTRUSIONS**

ALCOA ALUMINUM

Curtis Timken Bearing Air Compressor. Sizes from ¼ to 50 H. P., inclusive.



RELIABILITY
That Pays Off in Low-Cost Performance

CURTIS TIMKEN BEARING AIR COMPRESSORS

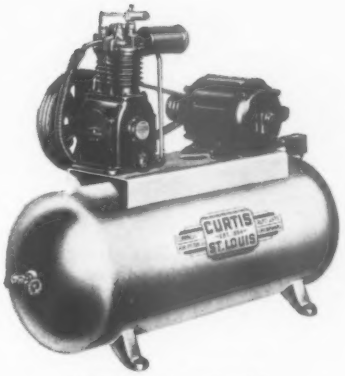
WHATEVER the application, in thousands of varied industrial installations, Curtis Timken Bearing Equipped Air Compressors have a long and proven record of extreme reliability, low maintenance expense and unusually long life.

Every Curtis Air Compressor has been carefully engineered, made of the highest quality materials and precision built throughout.

Their dependable, economical performance is the result of such design advantages as:

- Timken Roller Bearings
- Self-Oiling—Positive Lubrication
- Carbon-Free Disc Valves
- Automatic Pressure Unloader
- Fully Enclosed Design
- Precision Construction

Specify CURTIS when you want a reliable, low-cost supply of air for *any* use. Capacities from ¼ to 50 H.P. (up to 300 CFM).



Curtis Timken Bearing Air Compressor with tank. Sizes from ¼ to 10 H.P., inclusive.

Write today for full information on Curtis Air Compressors, Air Hoists and Air Cylinders—or mail the coupon below.

1-48-1

CURTIS

PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1995 Kienlen Avenue · St. Louis 20, Missouri

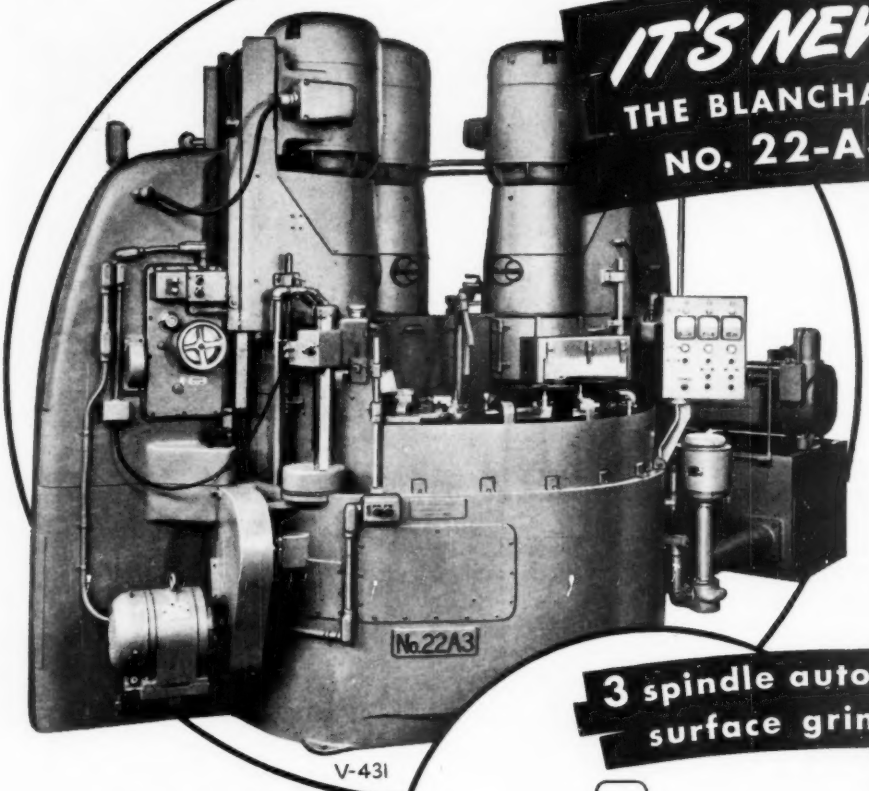
95 Years of Precision Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION *of Curtis Manufacturing Company*
1995 Kienlen Avenue, St. Louis 20, Missouri

Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

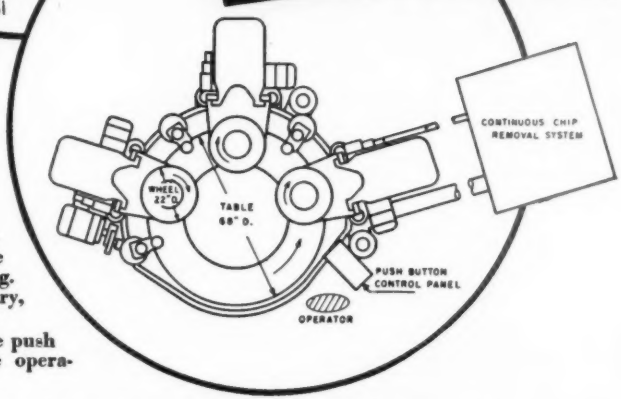
Name.....
Firm.....
Address.....
City..... Zone..... State.....

IT'S NEW...
THE BLANCHARD NO. 22-A3



V-431

3 spindle automatic surface grinder



This new Blanchard 22-A3 Surface Grinder is a three spindle machine, completely new in design from the floor up. It permits the grinding of larger work—the removal of more metal — and produces a finer finish than is possible on the Blanchard 16-A series.

The Blanchard 22-A3 may be arranged so that two wheels do roughing and one wheel finishing, or one wheel roughing and two wheels finishing. If a relatively rough finish is satisfactory, all three wheels can take heavy cuts.

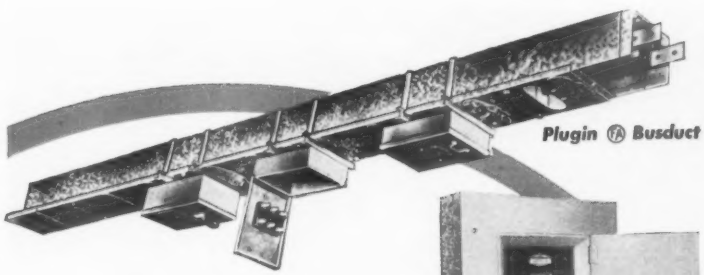
For ease of operation complete push button controls are located on the operator's panel.

For complete information on this or Blanchard 1, 2, 4 or 5 Spindle Machines in the new 22-A series with abrasive wheels 22" diameter, rotary tables 68" diameter and larger, write us today. New free catalog will be sent on request.

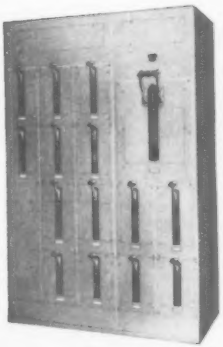
BLANCHARD

The **BLANCHARD** MACHINE COMPANY

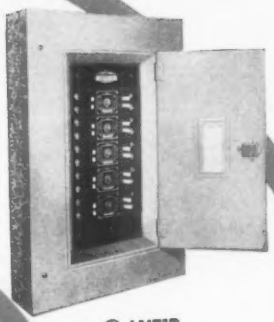
64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



Plugin Ⓕ Busduct



Ⓕ Shutlbrak



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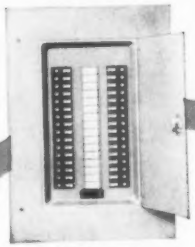

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Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

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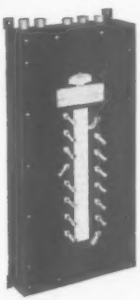
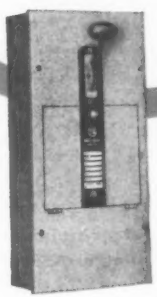


Ⓕ Shutlbrak Switch



Ⓕ Klampswitchfuz

The "inner circle" of quality has been reserved for Ⓕ for more than 58 years. Architects, Engineers and Contractors have specified electrical equipment bearing the Ⓕ Trademark . . . because Ⓕ products are safe, easily installed and constructed from a practical standpoint to give longer-lasting service.

Whether Switchboards or Safety Switches . . . Panelboards or Busduct . . . electrical equipment with the Ⓕ Trademark has been the center of attraction for greater electrical efficiency.

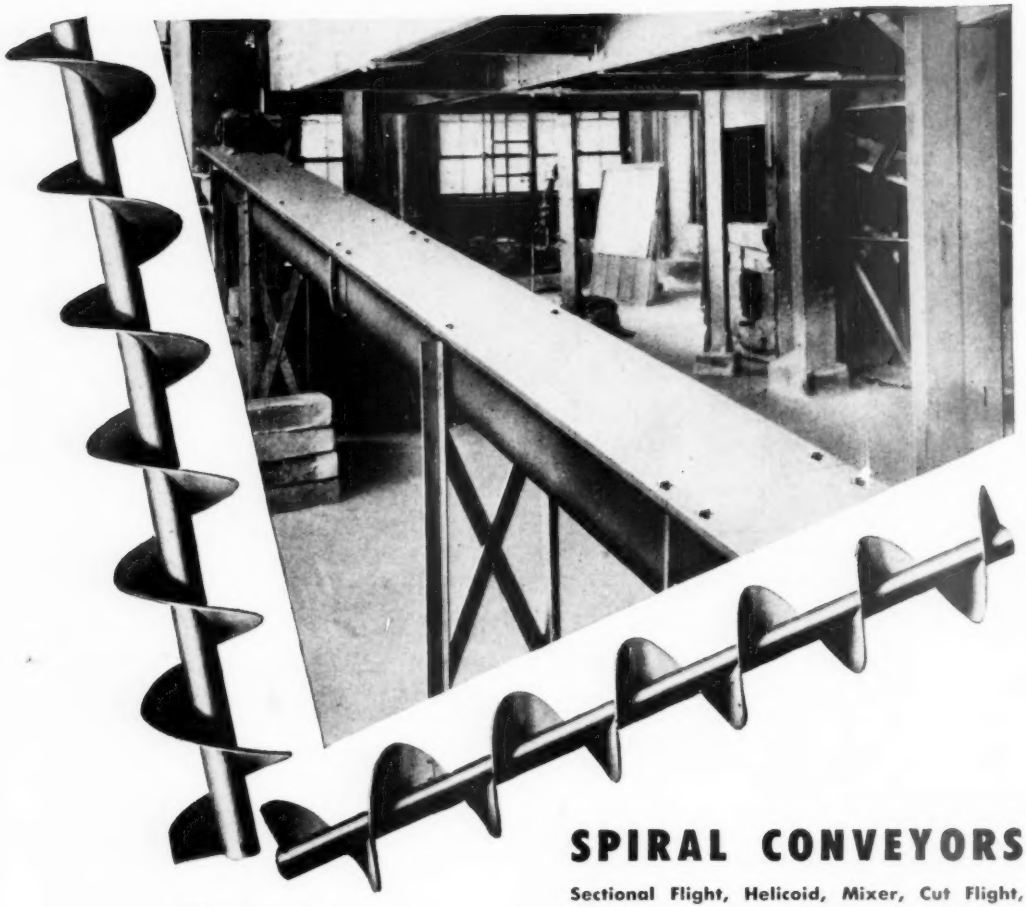
So when you want time-tested quality, specify Ⓕ Electrical Products.

EST. 1891 — THE SIGN OF A BETTER JOB

Frank Adam

ELECTRICAL PRODUCTS

FRANK ADAM ELECTRIC CO. ST. LOUIS, MO. U.S.A.



They meet Practically Any Requirement and Operating Condition

SPIRAL CONVEYORS

Sectional Flight, Helicoid, Mixer, Cut Flight, Ribbon and Cast Iron — six types manufactured by modern methods with equipment especially designed for the purpose, insuring uniform strength and true alignment. Handle many kinds of material — capacities vary with size of conveyor. No return strand — saves time and cost. Jeffrey spiral conveyors are interchangeable with other standard makes — are built to industrial standards. Write for data.

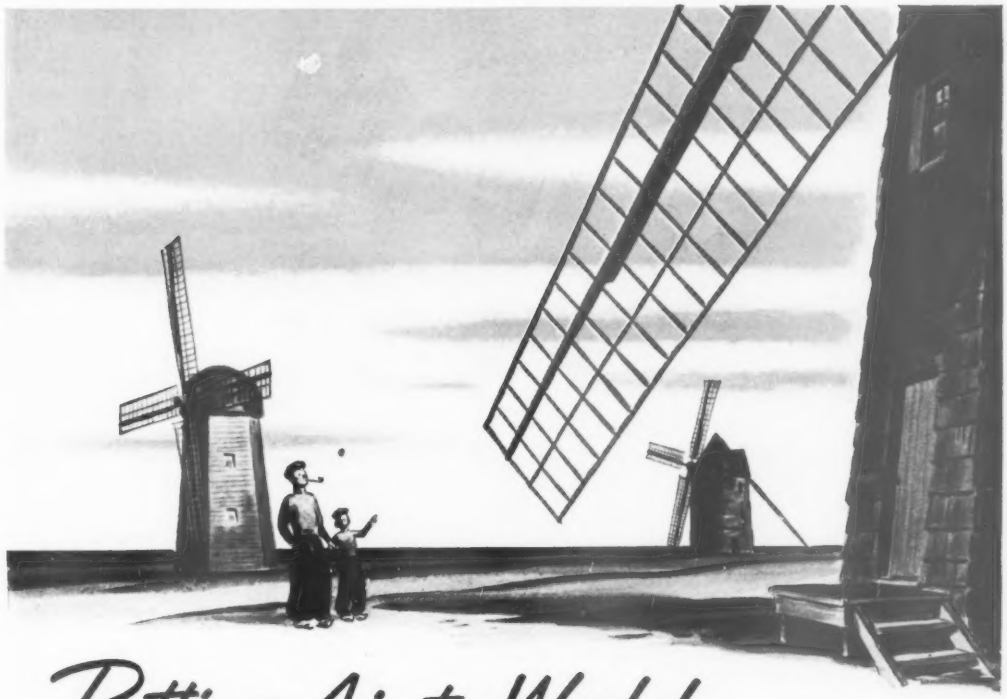
THE JEFFREY MANUFACTURING COMPANY

Established 1877

911 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2	Chicago 1	Detroit 13	Jacksonville 2	Pittsburgh 22
Birmingham 3	Cincinnati 2	Harlan	Milwaukee 2	St. Louis 1
Boston 16	Cleveland 13	Houston 5	New York 7	Salt Lake City 1
Buffalo 2	Denver 2	Huntington 19	Philadelphia 3	Scranton 3



Putting Air to Work!

This recent DeVilbiss installation in a modern stove plant increased production three times. Porcelain enamel ground coat is applied to about 75% of all parts which were previously japanned and about 90% of white parts are now being produced in one coat.

Wind was first used as a source of power many centuries ago. It was harnessed to drive windmills in Persia as early as 915 (A.D.) and is still used by the Dutch to power the windmills that prevent flooding of the low countries.

Since 1888 The DeVilbiss Company has also specialized in putting air to productive work. Spray guns and complete spray systems designed and built by DeVilbiss apply the beautiful, durable finishes that increase the salability of today's best selling brands. But, that's only part of the story. In industry after industry DeVilbiss spray equipment is helping to save costly manhours... minimize rejections due to faulty finishes . . . maintain peak production . . . and reduce mounting costs.

If you are wrestling with high costs in your finishing department, consult a DeVilbiss engineer. He will show you many money saving advantages so characteristic of DeVilbiss spray systems.

THE DEVILBISS COMPANY • Toledo 1, Ohio

Canadian Plant: WINDSOR, ONTARIO

DE VILBISS *means* **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

Durasheath

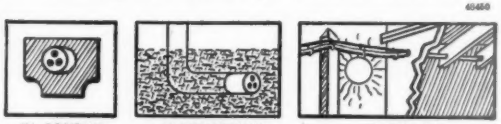
built for those TOUGH JOBS!

Small sizes or large . . . one, two or three conductors . . . moisture-resisting insulation . . . from 0 to 5,000 volts . . . Durasheath is built for rugged service:

Durasheath offers high tensile strength and resistance to impact and abrasion—*plus* extreme flexibility that makes it easier to handle. Also, Durasheath resists moisture, acids and alkalies generally found in the soil, eliminates problems of electrolysis, corrosion and extremes in temperature and is highly resistant to flame—making it possible to use a single type and size of cable in runs that are partly aerial, partly underground or in conduit.

For complete information, write for Publication C-27.

40480



IN CONDUIT ...UNDERGROUND ...IN THE AIR

Anacondaloy®-coated copper conductors are insulated with a moisture-resisting synthetic rubber compound, bound with color-coded rubber-filled tape and enclosed in a tough, high mechanical strength, moisture and flame-resistant outer jacket of Neoprene. Conductors have the lasting protection of a solid block of synthetic rubber and Neoprene.

®Reg. U. S. Pat. Off.

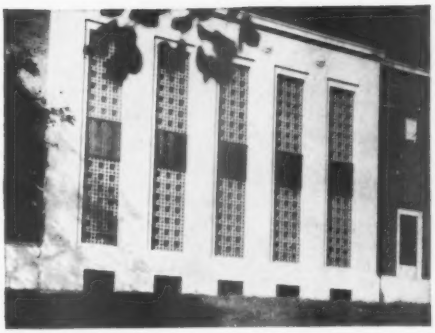
Durasheath

AN *Anaconda* PRODUCT

ANACONDA

ANACONDA WIRE AND CABLE COMPANY

25 Broadway, New York 4, N. Y.



Insulux Glass Block panels are both attractive and functional, in keeping with the best contemporary architecture. See inside view, shown in opposite photograph.

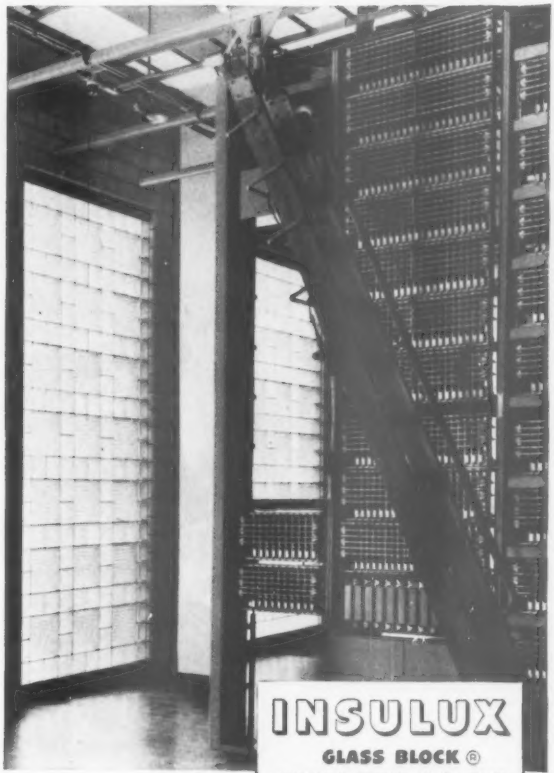
Do you need the protection of clean daylight?

CLEAN daylight, free from draft-borne dust and dirt, is an asset to almost any business. To some, it is a practical necessity, affording protection to plant equipment or product.

Many businesses needing this protection have installed panels of Insulux Glass Block in place of ordinary window and sash. Insulux provides a flush, easy to clean surface, cuts maintenance costs.

Insulux Glass Block has many other advantages which make it ideal for industry's daylighting jobs. It transmits light freely, insulates against heat and cold, cuts moisture condensation, and reduces transmission of distracting noises. It is strong and durable, free from rot, rust and corrosion.

Does your plant need Insulux Glass Block protection? By all means, investigate. Clip the coupon and mail today for an interesting and informative booklet on the varied uses for this versatile building material in industry.



No wrong numbers in this modern telephone exchange! Panels of Insulux Glass Block protect selectors from dust, dirt and moisture, reduce expansion and contraction of metal parts due to heat fluctuations. Bramble Exchange, Cincinnati Suburban Telephone Company, Cincinnati, Ohio. Architect: Harry Hake, Cincinnati, Ohio.

INSULUX
GLASS BLOCK ®
AMERICAN STRUCTURAL PRODUCTS COMPANY
Subsidiary of
OWENS-ILLINOIS GLASS COMPANY

MAIL COUPON TODAY

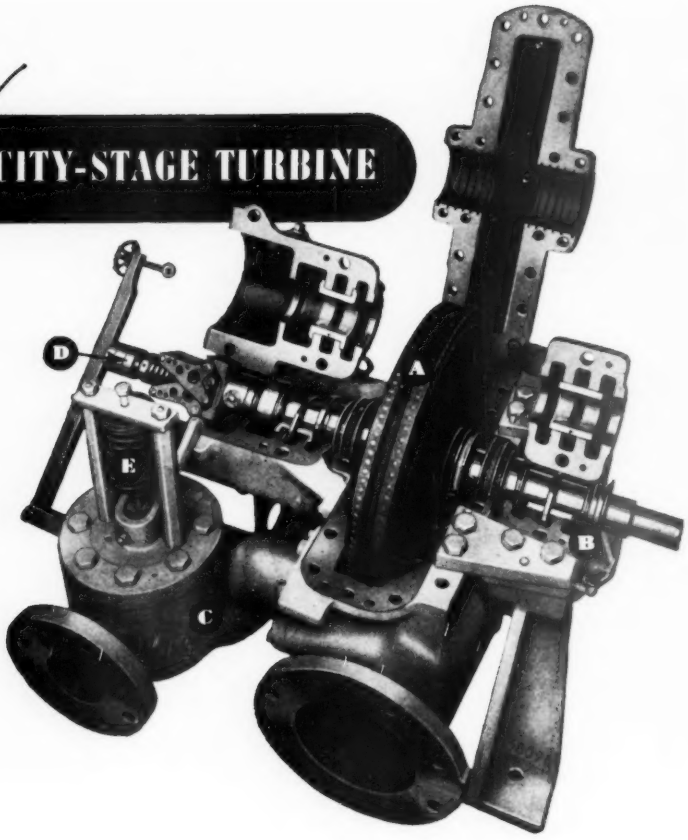
AMERICAN STRUCTURAL PRODUCTS COMPANY
Dept. F-26, P.O. Box 1035
Toledo 1, Ohio

Gentlemen:
Please send me your booklet on Insulux Glass Block applications, "Daylight in Industrial Buildings."

Name_____
Firm_____
Address_____
City_____ County_____ State_____

The New

DE LAVAL VELOCITY-STAGE TURBINE



A *Improved bucket and nozzle ring design,* for high efficiency.

B *Center line support and flexible mountings,* to avoid misalignment from thermal expansion.

C *Steam chest in lower half of casing,* to permit removal of casing cover without disturbing piping.

D *Improved speed control.* Balanced regulating valve and direct acting governor permit close speed regulation. Speed can be varied readily while turbine is running.

E *Separate trip mechanism* and emergency closing valve, operated by speed governor independent of speed regulating valve.

And many other improved features.

DE LAVAL
STEAM TURBINE CO.
TRENTON 2, NEW JERSEY

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T-14

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

80 ton Bliss No. 62 Punch Presses mounted on UNISORB at Stryeberg Engineering Co., Racine, Wisconsin

NO FLOOR DAMAGE

...Because There's No DRILLING!

Eliminate Bolts and Lag Screws ... Mount Machinery on UNISORB

Easy to install, UNISORB-Mounting requires none of the maintenance care and expense you've been used to.

A special cement (we supply it) binds the UNISORB pads to machine feet and floor with a holding strength of 1500 lbs. per sq. foot *minimum.*

And it absorbs from 60% to 85% of transmitted noise and vibration . . . saves floors, building, machinery . . . often permits higher machine speed.

You'll want all the facts handy the next time you move a machine, or add a new machine — *or a new plant* — to your operation.

Write . . . *right now!*

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210-A SOUTH STREET, BOSTON 11, MASSACHUSETTS

Offices: New York, Philadelphia, Chicago, Detroit
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THE FELTERS COMPANY
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Gentlemen:
Please send my free copy of "Why It Pays to Anchor Your Machines with UNISORB."

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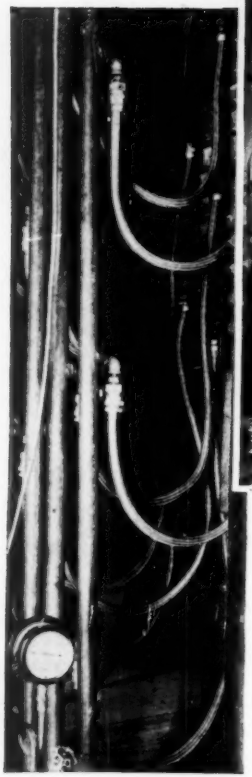
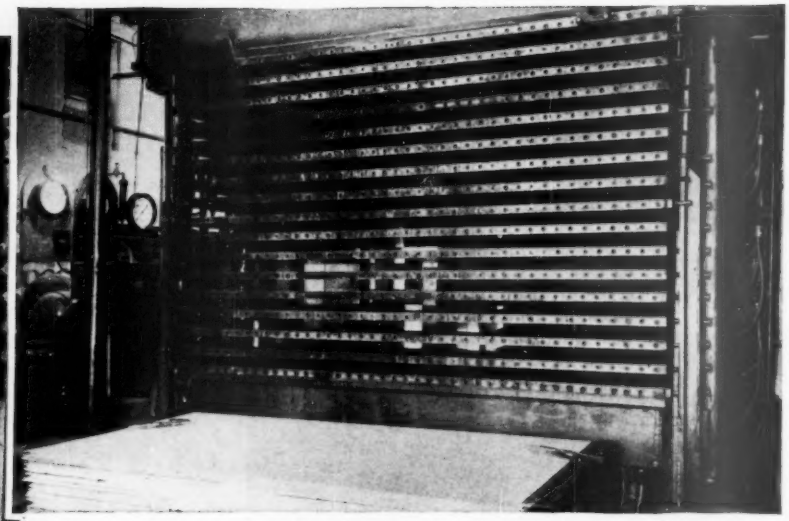




Above: 16-opening press for bonding plywood—at a large West Coast plywood plant. Note panels in foreground.
At Left: Close-up showing some of the American Seamless S-1 Flexible Bronze Tubing Steam Connectors to the 17 platens of the press.

Where Connectors must *Flex like rope* while carrying 75-lb. steam

THESE FLEXIBLE CONNECTORS stand a double test. They carry steam at 75 pounds pressure to the platens of a big, 16-opening plywood bonding press at a large West Coast plant. Because the platens move, flexible connections are a must. But safety and efficiency are important factors too, and the connections must be absolutely steam-tight as well as flexible.

For this job, American Seamless Flexible Bronze Tubing, ½" I.D., covered with a bronze wire braid for strength under pressure, made just the right connections. They were designed by American and supplied with heat-proof reattachable couplings—typical of our engineering advice on couplings which assures the best assembly for every hose or tubing duty.

FREE PROBLEM-SOLVING DEPARTMENT

You might have a connector problem where there is trouble caused by vibration, misalignment, the connecting of moving parts or piping in cramped spaces. Whether it involves conveying steam, oil, water, other liquids, semi-solids or gases, we can help you. We'll consider your problem, make recommendations and—if you like—design your connector specially from fitting to fitting, at no extra charge, using Seamless Flexible Metal Tubing or Flexible Metal Hose (made from spirally wound strip in a wide variety of metals). Comprehensive literature on request.

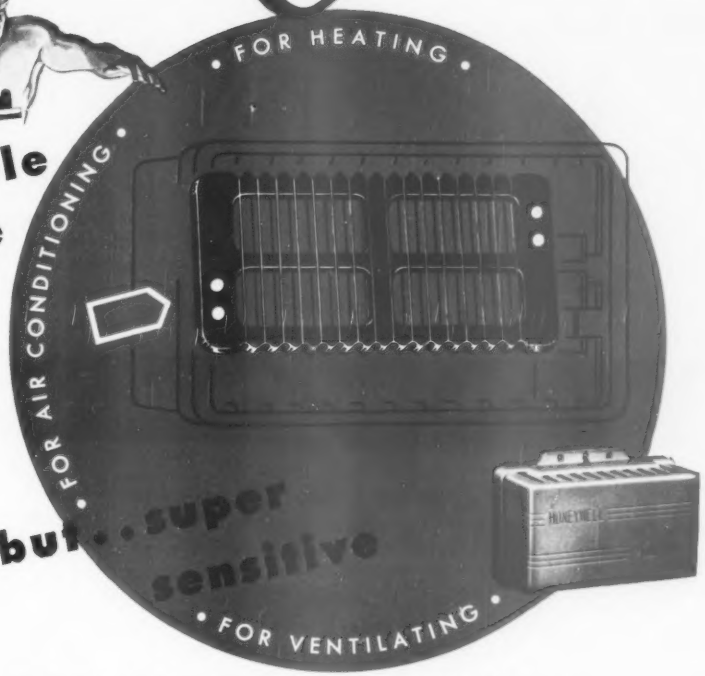
ANACONDA
from mine to consumer

American
METAL HOSE

THE AMERICAN BRASS COMPANY
American Metal Hose Branch
General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
Distributed in Canada by:
THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED

HONEYWELL Electronic Control

just a simple coil of wire



THE MAGIC of electronics now brings a new type of automatic control *100 times* more sensitive than existing controls for heating, ventilating and air conditioning. This new standard of precision control also brings extreme simplicity with added flexibility.

The Honeywell Electronic thermostat is a simple coil of wire with no moving parts—nothing to wear out. But see how other factors are simplified! Basic circuits are the same for all types of applications. Fewer control units are needed. Single thermostats, for example, can be used for both heating and cooling with automatic change-over from one to the other at any selected temperature level.

It means a simple, practical answer for many problems to which, until now, there has been no clear-cut solution. So watch Honeywell Electronic Control carefully. It's opening the way for new horizons in the industry. Minneapolis-Honeywell, Minneapolis 8, Minnesota. In Canada: Leaside, Toronto 17, Ontario.

MINNEAPOLIS **Honeywell** CONTROL SYSTEMS

73 BRANCHES FROM COAST TO COAST WITH SUBSIDIARY COMPANIES IN: TORONTO • LONDON • STOCKHOLM • AMSTERDAM • BRUSSELS • ZURICH • MEXICO CITY

OIL

with an engineering degree . . .

plus practical experience

To keep your production up . . . your costs down

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McGraw-Hill Surveys BUSINESS NEEDS

If it can get the money American industry in 1949 will go full steam ahead with a vitally-needed program of improving its facilities. This program since V-J Day has kept business expanding and has made belated headway in modernizing industry.

Furthermore, if it can get the money American industry will carry on for the next five years with its unprecedented program of expenditure for new plant and equipment. Plans already made call for spending about $55 billion.

These are findings of the McGraw-Hill national survey of "Business' Needs for New Plants and Equipment." Major results of the survey, which have been rechecked since election day, are summarized on the following page. They report what American industry is now planning to spend for new plant and equipment. *They do not and cannot show what will be done if the plans are hamstrung by political action.*

In 1949, the survey shows, American industry plans to spend $14.1 billion for new plants and equipment. That is only about 5% less than was actually spent in 1948.

If these plans are carried out, actual capital expenditures this year may be somewhat larger than they were in 1948. That is because expenditures usually prove to be larger than planned.

Fulfillment of American industry's plans for investment in new plant and equipment this year would no doubt mean a continuation of general prosperity. The record shows that when capital expenditures are high general business thrives.

Even more remarkable than the 1949 prospect is the fact that:

Industry already plans to spend $41 billion in the years 1950-53 to improve its plants and equipment.

Plans tend to taper off, of course, as they are pushed further into the uncertain future, five years from now. But the striking fact is that plans for expenditures so far ahead are as great as they are. They show American industry's need for tremendous improvements in its plants and equipment.

Again, let there be no mistake. These survey findings are not a five-year forecast. They report what leading corporations now are planning to do — *if they can get the money.*

But — won't industry be top-heavy with plants and equipment if it carries through any such program?

The answer is clearly — "No".

Here are some of the reasons why not that were disclosed by the McGraw-Hill survey:

First, manufacturing industries are shifting emphasis from expansion to improving efficiency.

They have increased their total capacity 56% since 1939. Their expenditures in 1948 went almost 50-50 for expansion and improvement. But in the next five years they plan to spend three-quarters of their funds to replace and modernize facilities, only one-quarter for expansion.

Second, the prospective rate of expenditure for new plant and equipment is relatively low.

Planned expenditures for new plant and equipment in 1949 represent about 7.5% of the present value of all plant and equipment. That rate of capital expenditure is no higher than the rate during previous periods of prosperity. And industry must overcome years of starvation for new equipment, caused first by the depression of the 30's, then by diversion to war production.

Third, industry is following an extremely cautious policy in buying new equipment.

Three out of four companies report that they will not buy equipment unless it will pay for itself within five years. And a third of the companies report that they expect new equipment to pay for itself within three years. The reason most frequently given for such expectations was that all the money available can be spent on equipment which does pay for itself quickly.

The program of capital expenditure planned by American industry is one of the greatest bargains ever offered to the American people.

To pay for itself in a few years, as equipment must if most companies are to consider buying it, that equipment

continued on next page

WHAT THE SURVEY SHOWS

● HERE ARE THE MAJOR FINDINGS of McGraw-Hill's survey of "Business' Needs for New Plants and Equipment". Rechecked since Election Day, results show what industry is now *planning* to spend for new plants and equipment. They do not forecast what will actually be spent. The survey shows:

1. Industry now plans to spend $14.1 billion in 1949 – and almost $41 billion in the four years beyond, 1950-53.
2. Manufacturing industries alone plan to spend $7.2 billion in 1949. This is 7.5% of the estimated value – $96 billion – of all manufacturing facilities.
3. Manufacturers estimate conservatively that it would cost $136 billion to completely replace their facilities with the most modern plants and equipment available.
4. Postwar expansion is virtually complete in most manufacturing lines. Major exceptions: steel and petroleum refining.
5. Expansion programs of railroads, utilities, and oil companies still have two to five years to run.
6. Manufacturing industries have increased their capacity 56% since 1939. But expansion is slowing down. Increase planned in the next five years is only 13%.
7. Efficiency is emphasized more and more in planning new facilities. Manufacturers plan to devote almost three-quarters of their funds to replace and modernize. In 1948, 58% went to increase efficiency this way.
8. Equipment should pay for itself in five years or less, say three out of four manufacturing companies. New buildings, say 77% of them, should pay out in 15 years or less.
9. Profits and reserves are counted on to pay for new buildings and equipment by three out of four manufacturing companies. Some 15% expect to borrow, only 9% plan to sell stock. However, 20% would like to sell stock, only 4% want to borrow.
10. More liberal depreciation allowances for income tax purposes would prompt almost two-thirds of the companies to speed their purchase of new plants and equipment.

● A copy of a complete report on "Business' Needs for New Plants and Equipment" may be obtained by writing me at McGraw-Hill Publishing Co., 330 West 42nd St., New York 18, N. Y.

must promise to produce much better products or make great savings in labor and material. The savings go first to the companies buying the equipment but, as they always have, they soon spread to everyone in the form of better products at lower costs.

Where does industry expect to get the money to buy this bargain for the American people?

Most of the companies covered by the McGraw-Hill survey (76% of the total) count on their own resources – largely profits – to pay for new plant and equipment. About 15% of them expect to borrow money, although only 4% like the idea of getting saddled with fixed debt. Only 9% of the companies expect to sell stock to investors, although twice that many report they wish they could.

What are the chances that business can get the money?

The survey provides no answer to that question. No survey can.

The answer will come from Washington – in what Congress does about taxes on profits and taxes on the millions of Americans who might invest a part of their income in industry's new plants and equipment.

The answer will be found also in the energy and skill shown by investment bankers, particularly in mobilizing the resources of the millions of Americans whose incomes have increased enough since 1940 to make them potential direct investors in industry.

Still another important part of the answer will be given by labor leaders. About half the companies surveyed by McGraw-Hill are holding back on new construction – primarily because of high costs. What organized labor does about wages and productivity can swell or shrink that percentage.

The McGraw-Hill survey leaves no doubt that American industry is fulfilling its responsibility. It is planning the capital improvements needed to make the nation secure, prosperous, and progressive.

But business today lacks confidence and badly needs added incentives. Proper taxation and increased depreciation allowances are vital if we are to open the capital markets to finance industry.

What will happen now depends in large part on what is done in Washington. In his State of the Union message, the President said that "business should plan for steady, vigorous expansion." But in his budget message he proposed new taxes which would divert a substantial share of the money industry is using for expansion and improvement. Moreover, he said nothing about the vital issues now freezing the capital markets.

It is not possible to have it both ways. Fulfillment of the President's tax program means cutting industry's program for new and better equipment. It means slowing down industrial progress. It means delaying the advance toward much higher standards of living tomorrow in order to have a little more government spending today.

I urge you to see that your Representative and your Senator have all the facts on industry's needs for new plant and equipment. What they do to this program will have a decisive bearing on the nation's security and welfare.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the fourth editorial of a special series on industry's needs for new plants and equipment—and what these needs mean to all Americans.

FACTORY
MANAGEMENT AND MAINTENANCE
L. C. MORROW, EDITOR

Management's Responsibility for a New Labor Law

THERE WILL BE A NEW LABOR LAW in 1949. Perhaps in early 1949.

How will it come? Washington observers now expect simultaneous repeal of the Taft-Hartley Act and reinstatement of an amended Wagner Act.

The demand by AFL and CIO that Congress repeal the Taft-Hartley Act and reinstate the Wagner Act "as is" seems likely to fail.

It is equally clear that insistence by management on retention of the Taft-Hartley Act in its present form would fail. So, too, would efforts to limit labor law changes to simple amendments to the present law.

This is not to imply that the Taft-Hartley Act is not a good law. In FACTORY's opinion, it is. FACTORY believes that under other political auspices the law could have been amended to make it an almost completely effective instrument of labor-management justice.

But that can't happen now. In the light of the facts, management would be more than wasting its time in any effort to retain the Taft-Hartley Act, either "as is" or amended. It might even goad Congress into hasty, punitive action. Can anyone deny that the uncompromising stand of the unions on Wagner Act amendments in 1947 had the effect of causing Congress to discount statements made by obdurate union leaders? Any action by management that might cause the 81st Congress to adopt a similar attitude on 1949 labor law revision would have a most unfortunate long-term effect on industrial relations.

On the other hand, management will be derelict in its duty if it adopts a defeatist attitude and accepts an unamended Wagner Act as a foregone conclusion.

Management's responsibilities in this situation are four in number:

1. *To employees*—who require continued protection against possible abuses by employers and discrimination by unions.

2. *To the public*—which requires the greatest possible protection against disruption of vital services.

3. *To management*—which requires protection against the effects of disputes to which it is not a party, as well as against infringement of its function to produce more goods for more people at lower cost.

4. *To unions*—which require recognition as a prominent and important part of the industrial scene. *Unreserved acceptance of this point will, more than anything else, enable management to demonstrate its good faith.*

How can management best fulfill these responsibilities? Its course seems clear:

Accept repeal of the Taft-Hartley Act. Insist upon simultaneous reinstatement of a thoughtfully amended Wagner Act *as a minimum requirement.* Bend every effort toward enactment of a completely new labor law based on the principles outlined above—and written with clear recognition of experience under both the Wagner and Taft-Hartley Acts.

That way lies our best chance for a new era of labor-management cooperation. Without such cooperation we cannot have the abundant production so essential to our economy.

What Labor Law

The Wagner Act regulated employers but not unions. The Taft-Hartley Act was passed to give better balance by regulating both. Labor's strong opposition to this law and the principle it involves has now produced results:

There will be a new labor law in 1949.

How good will it be? The answer rests not only with Congress but also with the representatives of management and of organized labor.

Management can make the mistake of adopting the same uncompromising stand the unions took two years ago; it can fight to prevent any change • Labor can make the mistake of trying to over-capitalize its political advantage; it can press for one-sided legislation • Congress can make the mistake of allowing itself to be stampeded; it can pass hasty, ill-considered legislation.

Together, all three can make a major contribution to good labor-management relations; they can push aside partisan considerations in favor of fair and workable legislation.

To aid in the difficult task of reconciling divergent points of view, FACTORY presents, in the following pages, an analysis of the issues, and its report and appraisal of a survey of the thinking of informed labor and management leaders.

In months to come, FACTORY will bring to its readers analyses and authoritative interpretations of whatever law emerges. Supplementing these articles on the law itself, of course, will be up-to-the-minute reports on the application of the law in industry and the tests it undergoes in the courts and before the NLRB.

Need for agreement

Regulation of certain types of union activities is essential, just as regulation of certain activities of business is essential. The problem is to determine *how much* to regulate and *what* to regulate.

Labor's demand to reinstate the Wagner Act is no solution. Nor is retention of the Taft-Hartley Act.

Critically needed now is an intelligent appraisal of experience under these laws as the basis for agreement on a sound legislative framework within which labor and management can work out mutual problems peacefully and in the public interest.

A good law will not come easily, but a bad law cannot be tolerated.

What are the issues?

Seven fundamental issues are involved in writing a new labor law:

1. *Regulation of union political and financial responsibility.* To be considered are such matters as

in 1949?

restrictions on union spending of funds for political purposes, union stability, and the much-debated non-Communist affidavit.

2. *Regulation of strikes threatening the public health and safety.* Involved here is the basic question of the extent to which government should be empowered to intervene, and the methods of intervention and control that should be specified.

3. *Regulation of strikes not threatening the public health and safety.* Where strikes do not threaten the public health and safety, the problem is one of devising ways to prevent abuses of the right to strike and picket, and to encourage the peaceful solution of disputes short of strikes.

4. *Regulation of rights of employees and employers.* For employees, the big question is whether they shall have the right to *refrain* from organizing as well as to organize. For management, it is freedom of speech and extent of control over union trust or welfare funds to which employers contribute.

5. *Regulation of unfair labor practices.* Whether union unfair labor practices shall be defined and restricted is the key problem. Closely related are retroactivity of unfair labor practice charges and the desirability of empowering government to obtain injunctions to restrain unfair labor practices.

6. *Regulation of union security.* The major elements involved are protection of employees in closed and union shops, and check-off of union dues.

7. *Regulation of elections and collective bargaining units.* Though technical, many important points are involved here. The status of independent unions, craft units, foremen, professional employees, and plant guards must be settled, as must the frequency with which elections may be held, rights of employees to seek decertification of unions, and employer rights to petition for elections.

These seven issues are by no means all-inclusive. All are important, however, and in total represent FACTORY's selection of the most critical problems.

What is at stake?

Labor's Stake. Labor has much to gain from reinstatement of the Wagner Act. It is battling every provision of the Taft-Hartley law which imposes restrictions on its right to organize, strike, to picket, to collect or expend funds, to check-off dues, initiation fees, or assessments. These and other activities can obviously be carried on more effectively, from labor's standpoint, if unregulated.

Management's Stake. Management wants reasonable freedom of speech, a spelling out of union responsibilities, protection against being caught "in the middle" in jurisdictional strikes, relief from damaging effects of secondary boycotts, protection against violence or coercion in organizing campaigns or on picket lines. These and other union activities could, if entirely uncontrolled, make management's job immensely more difficult.

The Employee's Stake. The employee wants the right to act in his own behalf. The legal right—if he chooses to exercise it—to refrain from organizing, to seek decertification of a union of which he disapproves, to discontinue check-off deductions, to remain in "good standing" under union security contracts without fear of discrimination.

The Public's Stake. The public must have protection against (1) interruptions to essential services; (2) hazards to health and safety caused by labor disputes, strikes, or violence; (3) subversive activities. Failure to provide such protection would seriously endanger the public welfare. What is called for is neither "strengthening" nor removal, but improvement, of controls.

Where do we stand?

Are labor and management really so far apart on these issues as some would have us believe? Would important areas of agreement emerge if the issues were removed from the context of the highly emotional "Taft-Hartley *vs* Wagner Act" argument?

To answer these questions authoritatively, FACTORY surveyed the men in labor and management best qualified to offer informed opinions. Detailed questions on labor law principles were asked of:

192 major executives of national and international unions, as listed in the 1943 Directory of Labor Unions of the Bureau of Labor Statistics; 30 responded.

300 labor relations executives of companies in all manufacturing industries; 178 responded.

Their anonymous replies are presented on the following pages, together with FACTORY's appraisal of the issues and analysis of the areas of agreement.

CONTINUED ON NEXT PAGE

WHERE LABOR AND MANAGEMENT STAND ON A NEW LABOR LAW

Areas in green denote agreement by majorities of both groups. Areas in black denote disagreement by majorities In the remaining cases, one or both groups failed to produce majorities

Figures are percentages of all respondents, when the total is less than 100 per cent, the difference represents the per cent of respondents who did not reply to a particular question.

1 Regulation of union political and financial responsibility

	POSSIBLE REPLIES	L	M
1 Should representatives of management and labor be required to sign affidavits certifying:			
a Non-membership in the Communist party?	Neither	30%	11%
	Both	50	77
	Labor only	—	1
	Management only	7	—
b Non membership in any organization which believes in or teaches overthrow of the government by force, violence, or illegal means?	Neither	17	6
	Both	73	90
	Labor only	—	2
	Management only	7	—
2 Should there be legal regulation of the manner in which unions			
a Raise funds for political purposes?	Yes	27	83
	No	63	7
b Spend funds for political purposes?	Yes	33	81
	No	57	7
c Account for funds spent for political purposes?	Yes	57	97
	No	37	2
3 Should it be permissible to sue unions in federal courts?	Yes	23	95
	No	57	2

FACTORY's POSITION

Both labor and management should be required to sign affidavits certifying non-membership in any subversive organization (to include Communist Party, though not by name, if and when the courts hold it is subversive). Employers and unions alike should be forbidden to use other than voluntary means to raise money for political purposes. Only limitation on spending should be a prohibition of direct contributions to political parties or candidates. Reasonable accounting of funds received and spent should be made to contributors, possibly to government agency. Civil suits against unions in federal district court normally having jurisdiction should be permitted for claims arising out of unfair labor practices, strikes in violation of contract, or actual physical damage.

2 Regulation of strikes threatening the public health and safety

	POSSIBLE REPLIES	L	M
1 Should Presidential Boards of Inquiry investigate strikes which threaten the national health and safety?	Yes	87%	96%
	No	13	2
2 Should such Boards be permitted to make specific recommendations for settlement of disputes?	Yes	83	79
	No	7	15
3 Should the government be permitted to seek temporary injunctions			
a To delay strikes threatening national health and safety?	Yes	63	98
	No	17	2
b To delay strikes threatening the health and safety of a community?	Yes	57	95
	No	23	5
c Under no circumstances?	Yes	17	2
	No	73	98

FACTORY's POSITION

Presidential Boards of Inquiry should be provided for in "national emergency" strikes, and Boards should be empowered to make specific recommendations. Injunctions at government request are essential to protect the public health and safety, and should cover strikes which imperil or threaten to imperil either communities or the nation as a whole.

Regulation of strikes not threatening the public health and safety 3

	POSSIBLE REPLIES	L	M
1. Should unions and employers be required to serve advance notice of strikes and lockouts?	Neither	20%	2%
	Both	57	97
	Unions only	3	1
	Employers only	13	—
2. In what types of strikes should participants be given full NLRB protection? *(Some respondents gave more than one reply; not answered by 10 and 14 per cent, respectively)*	All	30	8
	None	13	10
	Economic	37	35
	Unfair labor practice	37	49
	Violations of contract	30	40
	Unauthorized or "wildcat"	—	6
	Sympathetic	13	5
	Jurisdictional	10	7
	To enforce illegal demand	7	5
	"Union label"	10	3
3. Should federal law prohibit: a. Mass picketing?	Yes	20	89
	No	73	10
b. Violent and coercive picketing?	Yes	63	100
	No	27	—

FACTORY's POSITION

Advance notice of strikes and lockouts should be required. NLRB protection, including reinstatement and voting rights, should be given participating unions and employees in economic strikes and strikes against employer's unfair labor practices. Participants in other types of strikes, such as those in violation of contract, wildcat, sympathetic, jurisdictional, illegal demand, and union label strikes should be strictly "on their own." Violent and coercive picketing should be subject to government injunction, as should all picketing where numbers are large enough to imply coercion.

Regulation of rights of employees and employers 4

	POSSIBLE REPLIES		L	M
1. Should it be unlawful for an employer or union to interfere with, restrain, threaten or coerce employees: a. In the exercise of their right to organize?	Employer	Yes	87%	97%
		No	7	2
	Union	Yes	47	95
		No	30	2
b. In the exercise of a choice to refrain from organizing?	Employer	Yes	73	91
		No	7	4
	Union	Yes	33	92
		No	37	3
2. To what extent should management be accorded free speech?	Without limitation		10	25
	Short of promises and threats		50	74
	Severely limited		10	—
	No discussion of unionization		30	1
3. To what extent should an employer who contributes to a trust or welfare fund be represented on the board which controls the fund?	Sole		—	8
	Majority		3	35
	Equal		73	50
	Minority		17	1
	Not at all		7	1

FACTORY's POSITION

Employers and unions alike should be forbidden to restrain, coerce, or interfere with employees desiring to organize, or exercising a choice to refrain from organizing (except that legal union shop or closed shop contract may require membership). Employers should be accorded right of free speech short of threat of reprisal or promise of benefit. There should be equal labor-management representation in control of negotiated trust or welfare funds to which employers contribute, with arbitrator or public representative to break deadlocks.

5 Regulation of unfair labor practices

	POSSIBLE REPLIES	L	M
1. Should there be a broad restriction, some specific restrictions, or no restrictions on "featherbedding" or "make-work" practices?	Broad	13%	74%
	Specific	43	23
	No restriction	37	2
2. Should the government be permitted to seek temporary injunctions: a. To restrain unfair labor practices of employers?	Yes	53	82
	No	27	15
b. To restrain unfair labor practices of unions?	Yes	37	83
	No	33	14
c. Under no circumstances?	Yes	17	2
	No	73	98
3. In what types of secondary boycotts should participants be given full NLRB protection? (*Some respondents gave more than one reply, not answered by 47 and 48 per cent, respectively*)	All	10	9
	None	3	34
	Economic	27	6
	Unfair labor practice	27	11
	Violations of contract	30	9
	Unauthorized or "wildcat"	—	4
	Sympathetic	13	4
	Jurisdictional	7	4
	To enforce illegal demand	3	4
	"Union label"	7	2
4. Should the law require that unfair labor practice charges be: a. Filed with the NLRB within a fixed time?	Yes	67	91
	No	33	1
b. Heard by NLRB under civil court procedure?	Yes	43	70
	No	37	19

FACTORY'S POSITION

Featherbedding and secondary boycotts should be classified as unfair labor practices, but need careful definition which will be fair to both labor and management. If provision can be made for prompt issuance of temporary NLRB cease and desist orders pending formal hearing, unfair labor practices need not be subject to injunction. There should be limitation of retroactivity of unfair labor practice charges to prevent unreasonable delays in filing of charges. To guarantee equitable decisions, NLRB hearings should follow civil court procedures as to rules of evidence.

6 Regulation of union security

	POSSIBLE REPLIES	L	M
1. What legal restrictions should be placed on the closed and union shop? Closed shop. (*Some respondents gave more than one reply, not answered by 7 and 2 per cent, respectively*)	No restrictions	30%	5%
	Majority vote of union members	47	4
	Majority vote of all employees	3	25
	No discrimination in membership rules	10	8
	Prohibit	10	61
Union shop. (*Some respondents gave more than one reply, not answered by 20 and 13 per cent, respectively*)	No restrictions	37	6
	Majority vote of union members	30	6
	Majority vote of all employees	13	44
	No discrimination in membership rules	13	16
	Prohibit	—	25
2. Should check off of union dues be permitted: a. Under no circumstances?	Yes	—	16
b. With employee's authorization?	Yes	63	84
c. Without employee's authorization?	Yes	37	—

FACTORY'S POSITION

Closed and union shop agreements should not be banned by law. But the "closed union" should be. Further, union security agreements should be operative only if (1) union rules covering admission and expulsion of members prohibit financial, racial, religious, and political discrimination; (2) the contract, after negotiation, is ratified by a majority of all employees; and (3) there is reasonable opportunity for a disestablishment election. Check off of union dues should be permitted if authorized by employee and revocable at employee's option.

Regulation of elections and collective bargaining units 7

	POSSIBLE REPLIES	L	M	FACTORY's POSITION
1. Should craft units be given an opportunity to vote independently on inclusion in general industrial units?	Yes	60%	52%	Craft units should be protected by allowing them to vote separately on inclusion in big industrial unions. Professional employees and plant guards who wish to organize should be required to organize separately from unions of general industrial employees. Unions of foremen or other management groups should not be protected by law. All other unions, except company-dominated unions, should have equal status before the NLRB, regardless of whether independent or affiliated. The NLRB should be required to act on petitions by unions, employers, and employees alike.
	No	33	43	
2. Should foremen, professional employees, and plant guards be required to organize in units separate from those of general industrial employees?	Yes	40	85	
	No	53	10	
3. Should the NLRB be required to accord equal treatment to all unions (except company-dominated unions)?	Yes	100	93	
	No	—	5	
4. Should unions, once certified, be guaranteed that no further election would take place in the same bargaining unit for a reasonable length of time?	Yes	93	91	
	No	3	9	
5. Should the NLRB be required to act on petitions for elections: a. By employers when one or more unions claim recognition?	Yes	37	97	
	No	43	1	
b. By unions when another union is recognized or certified?	Yes	53	51	
	No	33	43	
c. By employees when a union is recognized or certified?	Yes	33	79	
	No	43	13	

Areas of agreement

The extent of the agreement between the opinions of the labor and management representatives surveyed is impressive and encouraging. Conversely, the extent of disagreement is hearteningly small. With 36 opportunities to differ, majorities of both groups were in *agreement* in 22 cases, or 61 per cent of the time. Majorities were in *disagreement* in only 6 cases, or 17 per cent. One or both groups failed to produce majorities in the remaining instances.

The survey is based on the replies of 30 labor officials, every one a major executive of an international or national union, and listed in the 1948 Directory of Labor Unions of the Department of Labor's Bureau of Labor Statistics. Every one is a man who could, if he spoke up publicly, have a tremendous impact on the nature of the new labor law.

If Congress were to seek the advice and counsel of these 30 men—as it has every right and reason to do—the task of reaching agreement on a fair and equitable labor law would be a relatively simple one.

Is even this too strong a conclusion to draw from so numerically small a sample? FACTORY thinks not, for two reasons:

1. The 30 men who replied are authorized to speak for their unions, and their unions represent more than 10 per cent of all the national and international unions listed by BLS.

2. The replies from even this 10 per cent demonstrate that there is not the unanimity of opinion among labor leaders which some spokesmen would have us believe.

These statements would be true even if the returns were completely unrepresentative. The only reason to believe that the replies are not representative is the repeated public declamation that labor is "100 per cent for return to the Wagner Act."

Yet one of the men who says this most loudly did not back up his position by indicating it in the questionnaire. Instead, he went to the far greater trouble of writing FACTORY a long letter in which he explained his failure to answer by saying:

"I would not in advance wish to make public decisions which might have to be modified in the light of changing circumstances."

While one such letter does not necessarily validate FACTORY's survey, it certainly is an admission that much of the present "public policy" of many unions is propaganda put out for the purpose of establishing a favorable bargaining position.

Because such extreme positions tend to obscure basic areas of agreement, they are constructive neither at the bargaining table nor in the Congressional hearing room. The lesson is clear for both management and labor: *Insistence on maintaining an inflexible attitude toward labor law change will necessarily place Congress in the position of the ill-informed arbitrator, whose decision is frequently satisfactory to neither party.*

A frank discussion of issues, coupled with a frank willingness to make concessions which do not contravene the public interest, will place Congress in a position to write a law that will serve both unions and management well, and, more important, will protect the employee and the public.

FACTORY believes that a good place to start such a discussion would be on the issues on which its survey indicates the possibility of already existing

agreement. Ten such areas will now be examined in detail:

1. *Protection against subversive influence.* Heavy majorities of both management and labor are agreed on the desirability of requiring representatives of both management and labor to sign affidavits certifying non-membership in any subversive organization. Lesser majorities would include the Communist Party, by name, in such an affidavit. FACTORY believes that this point indicates the relative ease with which agreement could be reached if the parties would disavow their extreme "bargaining positions" and examine the issue out of the context of the political "Taft-Hartley" situation.

2. *Protection of the national health and safety.* This is perhaps the least controversial of all the points involved in the writing of a new labor law. Four-fifths and more of labor and of management agree on the necessity of Presidential Boards of Inquiry to investigate "national emergency" strikes, and almost as many would empower such boards to make settlement recommendations. Evidence of the serious regard in which labor men hold this point is the fact that better than 60 per cent are willing to see the government given the use of the injunction for delaying such strikes.

3. *Prohibition of violent and coercive picketing.* Labor, by two-thirds majority, would accept a ban on violent and coercive picketing, but rejects a ban on mass picketing by virtually the same vote. FACTORY believes that this apparent contradiction may result from a fear on the part of unions that mass picketing will be so defined as to proscribe legitimate activities. With agreement once reached on violent and coercive picketing, it should not be difficult to define mass picketing in such a way as to protect unions as well as employees and the public.

4. *Free speech for employers.* Just short of a majority, 50 per cent, of labor respondents accept the principle of free speech for management "short of threats and promises," as now specified. An additional 10 per cent go even farther, say that management should have free speech *without limitation.* Thus a clear majority of labor is in accord with management's desire for sensibly limited discussion of union activities.

5. *Limitations on featherbedding.* A majority, 56 per cent, of labor respondents indicate their desire for some type of limitation on featherbedding practices. The only question seems to be whether the limitation should be *broad* (favored by management) or *specific* (favored by unions). This again emphasizes the point made by FACTORY that a most careful definition is needed. With acceptance in principle, it should not be impossible to agree upon one that will be fair to both labor and management.

6. *Retroactivity of unfair labor practice charges.* Two-thirds majorities of labor and management agree that a reasonable time limit should be fixed. Whether the law should continue to specify six months should not be a serious stumbling block to new legislation.

7. *Union security.* Majorities of both labor and management agree that some limitation should be placed on the union shop; the problem is one of reaching agreement as to what the specific limitation should be. Despite the fact that 61 per cent of the management respondents say the closed shop should be prohibited, FACTORY believes that, once the union shop issue has been settled, it is possible that management would be willing to see the same principle extended to the closed shop.

8. *Check-off of union dues.* Substantial majorities of labor and management agree that an employee's authorization should be a prerequisite to check-off of a union member's dues, fees, and assessments. With this agreement on basic principle, the problem of revocability should be easy to resolve.

9. *Equal treatment of unions.* Labor is unanimous, and management almost so, in saying that the NLRB should be required to accord equal treatment to all unions (except company-dominated unions). This high degree of accord should eliminate any disagreement over continuing the ban on NLRB discrimination against independent unions.

10. *Frequency of elections.* Better than nine out of ten respondents of both management and labor agree that unions, once certified, should be guaranteed that no further election take place for a reasonable length of time. Reaching accord on what is a "reasonable time" is the only problem, and should certainly not be difficult to overcome.

In addition to the ten areas outlined above, there are nine other areas in which there is some indication that agreement already exists, or that divisions of opinion among either management or labor make the reaching of agreement a distinct possibility:

1. Accounting for political funds.
2. Advance notice of strikes.
3. Right of employees to organize.
4. Right of employees to refrain from organizing if they choose to do so.
5. Control of union welfare funds.
6. Use of injunctions in unfair labor practices.
7. Use of civil court procedures as to rules of evidence in hearing unfair labor practice charges.
8. Independent voting for craft units.
9. Elections on petition of intervening unions.

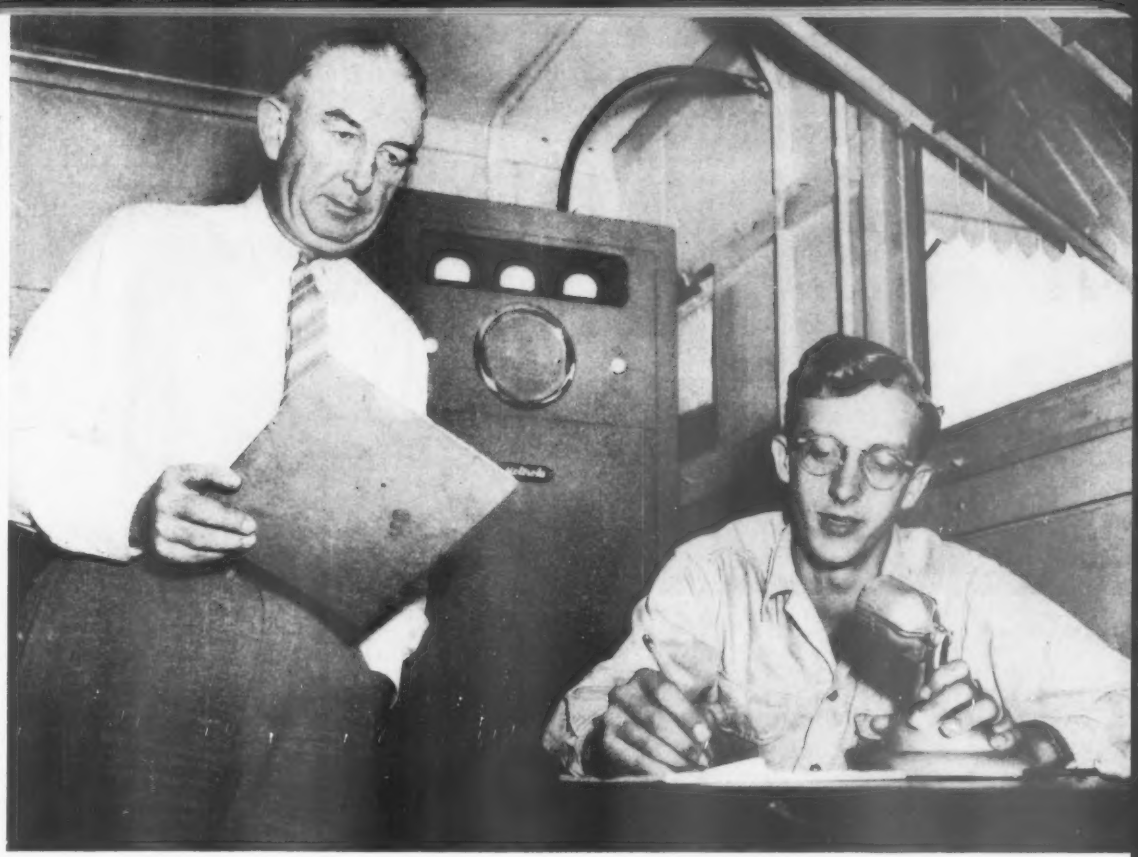
★ ★ ★

TO SUM UP: Analysis of the survey makes one fact stand out above all others:

There is no insurmountable obstacle to labor-management agreement on a new labor law.

Whatever new law emerges will, and should, fall short of meeting in every particular the specifications that would be laid down by either labor or management, were it writing a law without reference to the point of view of the other. But FACTORY feels strongly that its survey indicates a genuine desire to reach agreement on a law that will be in the public interest.

This will be the third new labor law in 14 years. FACTORY hopes that experience with the Wagner and Taft-Hartley Acts have taught both labor and management that they cannot rely on *any* legislation to do more than set the stage for good labor relations. The *basic* job must be done at the bargaining table and in the day-to-day contacts of labor and management.



JAM-BREAKING straddle trucks are called into action by radio when required in any part of plant. Drivers are kept informed of latest changes in materials manifests in the same fast, money-saving way

Truck Control by Radio

Timken Roller Bearing is handling more loads with two trucks than it formerly could with three as a result of installing a two-way, mobile FM radio system

A SERIOUS MATERIALS HANDLING problem has been solved at the Steel & Tube Division, Canton, Ohio, of Timken Roller Bearing Company by the installation of a two-way mobile FM radio system.

Handling of heavy steel stock in the 250-acre storage yard needed to be speeded up. Three straddle trucks were purchased, increasing loading speed and saving $15 a day.

However, the problem of controlling operations for the trucks in this vast area considerably reduced their over-all potential effectiveness. It always seemed that when they were urgently wanted in one part of the yard, they were busy in another. The solution was found in the form of an electronic "thumb"—a two-way FM radio system operating under license from the Federal Communications Commission, consisting of three 10-watt dispatcher units controlled by a 30-watt central station.

The day following the radio installation, one truck went on standby duty, and seven 8-hour truck shifts per day were cut to five. Thirty days later the records showed that two trucks handled 354 more bundles of steel than did three the preceding month at a saving of 39 operating hours. In addition, processing of orders had been cut anywhere from 48 hours to five days.

Shifting one truck from active to standby duty allowed an extra dispatcher in the plant ambulance.

Further installations are being contemplated on railroad and locomotive cranes, and on other trucking equipment.

Less Handling, Lower Unit Cost

Conveyors, efficiency work tables, unit containers, lifting devices, special carts, tilting machines, and stockracks speed packaging and packing operations

ELIMINATION of much intermediate handling has enabled Plomb Tool Company, Los Angeles, to increase efficiency in packaging and packing operations.

The problem was solved by adherence to such basic engineering principles as (1) maintaining common work heights, (2) reducing motions to lowest practical classifications, (3) pre-positioning materials to eliminate *search* and *select* operations, and (4) moving and storing tools in fixed units.

Results are reflected in greater accuracy in filling orders, reduction of inventory effort, safer working conditions, and lower unit cost.

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1 PACKAGING DEPARTMENT. Tools are received directly from the manufacturing division in toteboxes of 10-cu.-ft. capacity. The photograph shows the relative arrangement of box-staying machines (foreground), packaging tables (background), and disposal conveyor belt (against rear wall).

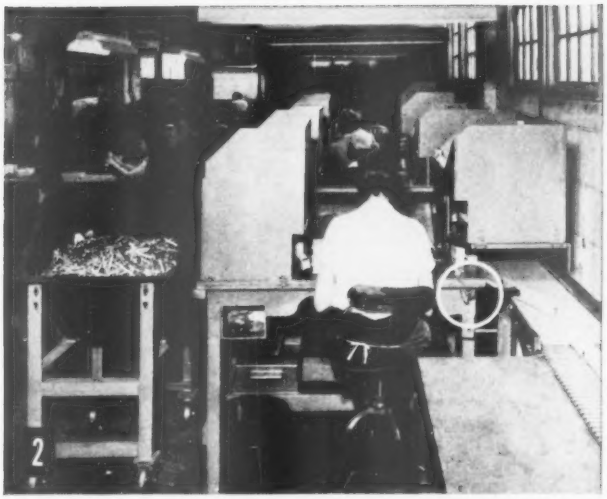
Box flats are labeled, prefolded, and stacked for the two stayer operators by the two girls seated at tables just inside the railing.

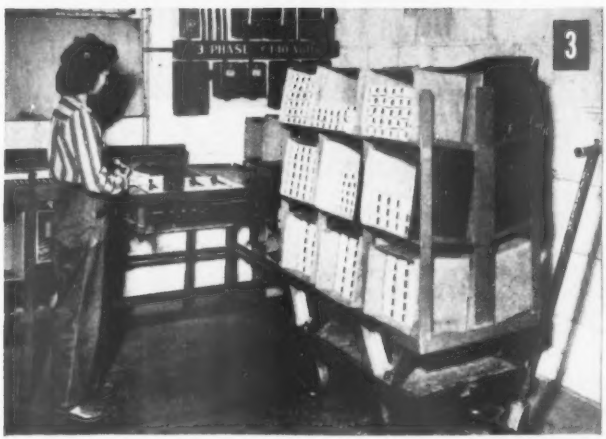
By the proper conditioning and positioning of the work, the machine operators can assemble 9 boxes (72 strokes of the press) per minute. Production records are kept by counters on the machines. Telltale lights (circled) are used to notify utility man when box or tool supply is low. Assembled boxes are dropped into large corrugated boxes—when full, into hoppers on the packaging tables.

2 PACKAGING TABLES. At first three tables in packaging line, small tools (80 per cent of total volume) are transferred from toteboxes into pans. Benefits from motion economy far outweigh cost of transfer operation. Pans are placed on lifting shelf.

Sequence of operations: (1) Operator places packed box on disposal conveyor with right hand, gets box bottom from hopper with left; (2) gets tools from pans and places them in box bottom with both hands; (3) gets box lid from hopper with right hand, pre-positions box bottom with left; (4) puts lid on box with right hand while left holds box. In repeating the first operation, the assembler gives box quarter turn to bring it into position parallel with conveyor. As box is slid toward conveyor it passes across taping machine, sealing right side of box, then across counter which records number of boxes packaged.

As level of tools in pan reaches point where they will not spill, pans are tilted at 45-deg. angle. This practice keeps tools close to operator, another form of pre-positioning. As box tops or bottoms are worked out of reach, operator closes hopper door and tilts hopper forward, sliding remaining boxes to proper position. Hopper is then





lowered to normal position, door opened, packaging resumed.

Since it is not practical to transfer large tools into pans, totebox on dolly is rolled into well cut in last two tables (see Figure 1, which shows totebox in such position). Operators must stand and work directly from toteboxes. Switch (circled) is used to turn on telltale light (Figure 1).

3 ACCUMULATION TABLE. Boxes of tools come off conveyor belt and proceed via roller conveyor down accumulation table. Table is equipped with taping machine and counter. Taping machine has four sealing heads that can be used individually or in any combination. Each head is placed in or out of operation by depressing or releasing thumb lever located under table. As boxes of tools come off conveyor belt and proceed via roller conveyor down accumulation table, operator pulls them toward her and across sealing head or heads, sealing left side. Boxes are then placed in unit container for transportation to stockracks.

4 UNIT CONTAINERS. They are 11-in. cube boxes of fiberboard—in effect, portable stockracks. Dimensions are primarily determined by external standards rather than product sizes. Boxes are intended primarily for internal transportation. Permit stockhandling from 10 to 50 times as fast as by previous methods. Save from 3 to 40 minutes for each container load, depending on size.

Unit container transportation (UCT) cart and portable hoist are used to move and lift containers. Cart also serves as segregating device as boxes come off accumulation table (Figure 3). As many as five different sizes of boxes or items may be in process at any one time and must be quickly segregated and disposed of. (Two-wheel skid on which UCT cart is mounted is being used pending acquisition of a fork truck.)

With unit container system, stockrack is no longer just a storage bin, but an integral part of handling systems. It was primary factor in determining dimensions of unit container. Top shelf does not exceed 58-in. height limit of elevator. Amount of intermediate handling eliminated by unit container plan can readily be understood by comparing individual and group stocking and handling of packages.

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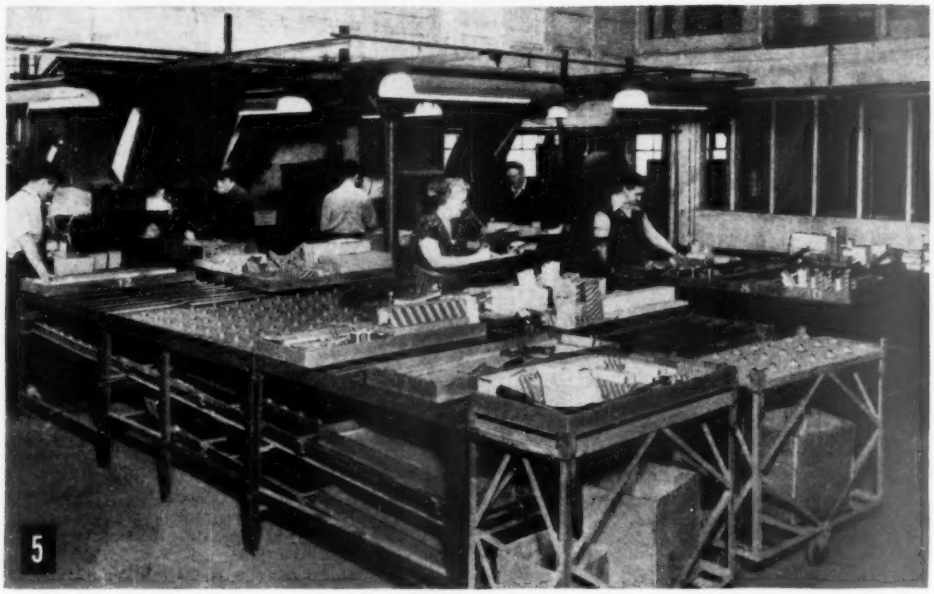
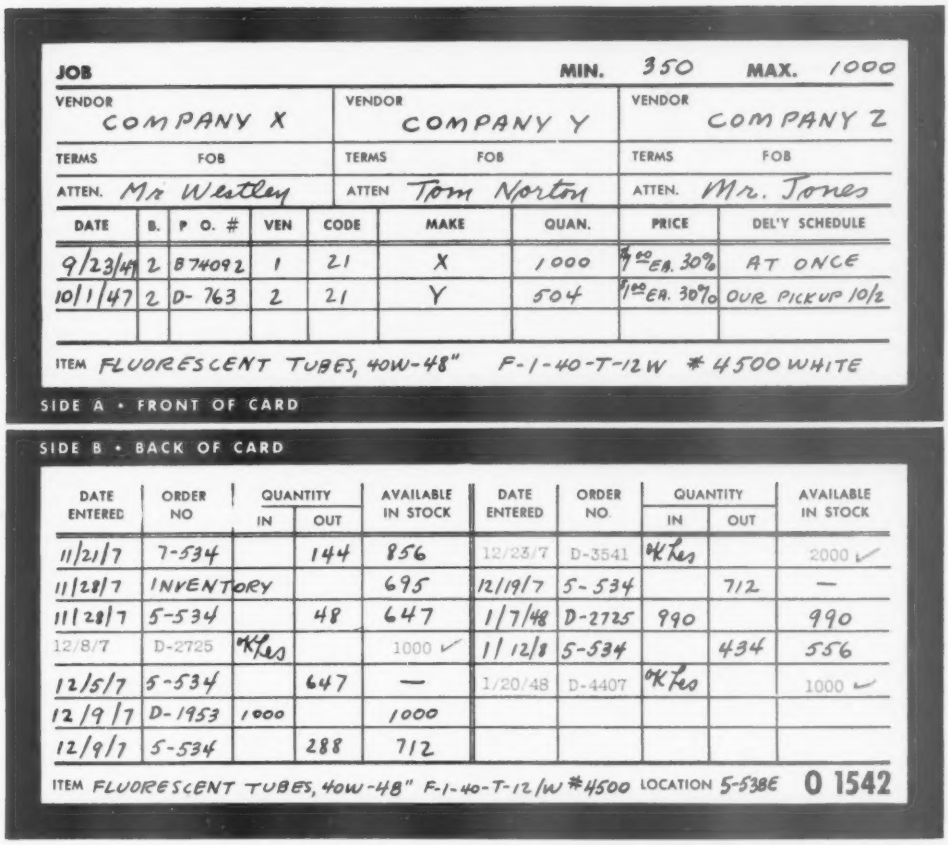


5 ORDER FILLING AND PACKING. Trays mounted on carts with ball-transfer tops (see foreground of photograph) are used. After order filler has picked customer's order from stock, he wheels cart to freight packing table. Tray is placed on rollers, rolls down to position within reach of checker-wrapper standing in table well.

Checker pulls tray across ball-transfer section to work position. Customer's order is removed from tray and placed on clipboard writing platform. Tools are checked by reading labels of boxes. Loose tools are pre-wrapped at this station. Under table top, operator has sliding wrapping platform and facilities to hold two sizes of pre-cut paper, three sizes of paper bags, one roll of paper, one tape machine. All necessary packing supplies are pre-positioned.

After order has been checked, tray is rolled down to any one of four packers. As packer receives tray, he judges order to determine size of shipping case needed, rings bell to alert crate assembler on mezzanize, and calls out crate number. Case is dropped down chute to position in front of packer. Packer lowers case to roller-top packing rack. Banding materials, nails, and excelsior are mounted in convenient positions. As packer empties tray, it is placed on "skate" conveyor under table and rolls back to front of table within easy reach of order filler. When shipping case is packed, it is pushed on roller conveyor and moved directly into shipping department.

6 SHIPPING. As each case of tools is received in shipping department, it is rolled onto a scale, weighed, stenciled, then pushed to a hydro-pneumatic foot-operated tilting machine. Machine tilts case gently to floor for transfer to hand truck. Case is then wheeled to storage area or directly into waiting truck for shipment.



JOB — MIN. 350 MAX. 1000

VENDOR	VENDOR	VENDOR
COMPANY X	COMPANY Y	COMPANY Z
TERMS FOB	TERMS FOB	TERMS FOB
ATTEN. Mr Westley	ATTEN Tom Norton	ATTEN. Mr. Jones

DATE	B.	P O. #	VEN	CODE	MAKE	QUAN.	PRICE	DEL'Y SCHEDULE
9/23/47	2	B74092	1	21	X	1000	1/2 EA. 30%	AT ONCE
10/1/47	2	D-763	2	21	Y	504	1/2 EA. 30%	OUR PICKUP 10/2

ITEM FLUORESCENT TUBES, 40W-48" F-1-40-T-12W #4500 WHITE

SIDE A • FRONT OF CARD

SIDE B • BACK OF CARD

DATE ENTERED	ORDER NO	QUANTITY IN	QUANTITY OUT	AVAILABLE IN STOCK	DATE ENTERED	ORDER NO.	QUANTITY IN	QUANTITY OUT	AVAILABLE IN STOCK
11/21/7	7-534		144	856	12/23/7	D-3541	OK Les		2000 ✓
11/28/7	INVENTORY			695	12/19/7	5-534		712	—
11/28/7	5-534		48	647	1/7/48	D-2725	990		990
12/8/7	D-2725	OK Les		1000 ✓	1/12/8	5-534		434	556
12/5/7	5-534		647	—	1/20/48	D-4407	OK Les		1000 ✓
12/9/7	D-1953	1000		1000					
12/9/7	5-534		288	712					

ITEM FLUORESCENT TUBES, 40W-48" F-1-40-T-12/W #4500 LOCATION 5-538E 0 1542

REQUISITION RECORD, MAINTENANCE INVENTORY-CONTROL, AND BUYER'S GUIDE ALL SHOWN ON SINGLE CARD

One-Card Inventory Control in Maintenance

L. R. CARMICHAEL SUPERVISOR OF CENTRAL STORES, JACK & HEINTZ PRECISION INDUSTRIES, INC., CLEVELAND

ONE PERMANENT RECORD CARD is all that is needed at Jack & Heintz for close control of maintenance parts, tools, and factory supplies. It eliminates a lot of paperwork.

The record card serves both as a requisition record and a maintenance inventory-control record. Also, the card gives the buyer accurate information with which to place orders.

Below is explained, step by step, the procedure for setting up and using the system.

1. Side *A* of the card has space for vendor information, names, addresses, terms, and persons to get in touch with. The upper right corner lists minimum and maximum order quantities.

Below this information is kept a chronology of purchases. At the bottom is product information.

2. On side *B*, plant order numbers are listed with dates and amounts of stock movement. At the bottom is product information.

3. The sample shown was purposely selected to reflect a signifi-

cant number of entries. (Form in actual use has more entry lines.) When, for example, 40-watt, 48-in. fluorescent tubes fall below the desirable stock quantity, the order clerk removes the card from its file. The card carries a reference number (side *B*, lower right).

4. On side *B*, the clerk enters in red in the "Available in Stock" column a requested quantity.

5. A white card carrying the date of removal is dropped in the file as this card is removed.

6. The order clerk gives the card to the stores foreman. He, in turn, checks the production schedule in reference to the item (not necessary in this instance), and determines if the quantity entered by the clerk is all right in terms of demand for the next 60 days.

7. The foreman then okays the quantity for purchase and forwards card to the stores supervisor.

8. When the stores supervisor receives this card for the first time (the item never before having been requisitioned) he assigns the card a number from the company's accounts manual, in this case, 5-538E (lower right). Upon subsequent receipt of the card, he checks the requested purchase quantity and prices against the proper budget. He then initials his okay in the "Quantity In" column.

9. Purchasing department next receives the card from the stores supervisor. A stenographer records its arrival by number and date on a steno pad for follow-up purposes. A purchase order is made up and its number entered on the card.

10. In purchasing, the card is routed to the buyer responsible for placing the order.

11. When the card was first prepared for this item, the buyer recorded on it standard data shown on side *A*. This was also done when alternate vendors were selected.

12. The buyer places the order, records the transaction on side *A*, sends the card back to the stenographer who notes completion of the purchase and checks off the card number on her steno pad.

13. Back to the stores department file goes the card.

14. When the receiving department receives the material covered by the order, a copy of the receiving report is sent to the stores department. From that report, the stores clerk records receipt of the material on the card under—"Date Entered," "Order Number," and "Quantity In." He then adds the quantity to the previous total indicated in the "Available in Stock" column.

15. Dispersals from stock are then made in the customary manner and the process is repeated when necessary.

Zone Plan Assures Best Upkeep at Lowest Cost

KIRK HAMILTON • SUPERINTENDENT OF MAINTENANCE AND CONSTRUCTION, AC SPARK PLUG DIV., GENERAL MOTORS CORP., FLINT, MICH.

INCREASED SPEED and efficiency in getting jobs done have been achieved through reorganization of the maintenance department at AC Spark Plug Division. No longer is there separate supervision of millwrights, pipefitters, electricians, and other maintenance crafts. Maintenance zone foremen now supervise all crafts.

The results of this streamlined maintenance organization speak for themselves—maintenance manhours down, craftsmen are working together in harmony on common jobs, and over-all maintenance work is being performed better and more efficiently.

Previously, each craft was supervised by a foreman. There was no direct supervision over all crafts when working together on a common job. Often the craftsmen would be off on a maintenance job without any supervision. This proved to be inefficient and resulted in high maintenance costs.

The construction and maintenance division is now subdivided into two main groups: (1) Four general maintenance crews, with several of the various tradesmen assigned to them, responsible for all routine and regular maintenance of a given plant area; (2) several construction crews responsible for all new installations of equipment and machinery.

The plant was subdivided into four key maintenance zones: spark plugs, fuel pump and silencer, polishing and platings, and instruments. A typical maintenance crew assigned to a zone includes four electricians, three pipefitters, five millwrights, one welder, and one painter.

A typical construction crew is made up of eight electricians, four pipefitters, four millwrights, one painter, one truck driver, and three welders. A service crew consisting of several sheet metal workers and carpenters serves all zones and construction crews.

In the old organization there was one general foreman for each of the crafts. There was little harmony or teamwork with this type of organization. By breaking these crafts apart and eliminating craft foremen, the maintenance job is being done better and more efficiently.

The organization now functions like this: Highly skilled zone foremen, each thoroughly qualified in all trades, supervise all functions of the maintenance crew in their zones. One general foreman oversees the zone foremen and construction crews on each shift. The superintendent of construction and maintenance oversees the entire function and is also responsible for sanitation, pyrometers, and other maintenance services as well as correlation of work among the three shifts.

Through these improvements, this company has accomplished an efficient, flexible type of maintenance organization. With close zone supervision over the entire maintenance crew, it is possible to have a more effective working group, and efficient, prompt general maintenance work is accomplished.

SELF-PROPELLING STEPLADDER makes upper shelves of pattern storage racks easily accessible. Trolley-duct lighting insures visibility

Solving the Problem of Pattern Storage

MURRAY A. YOUNG • TIME STUDY SUPERVISOR, THE BLACK CLAWSON COMPANY, HAMILTON, OHIO

PLANT: The Keuthan Foundry Company, Middletown, Ohio, subsidiary of The Black-Clawson Company, Hamilton, Ohio.

PROBLEM: Replace leaning, wobbly, space-wasting, dirt-collecting, poorly lighted wooden racks for pattern storage with safer, more easily accessible facilities.

PROCEDURE: Try to gain from experience of others by examining a variety of pattern storage facilities at the home foundry and in the community.

SOLUTION: Tubular steel framework, expanded metal shelving, and cast-iron fittings—chosen upon seeing this construction partially exemplified with excellent results at The R. K. Le Blond Machine Tool Company, Cincinnati.

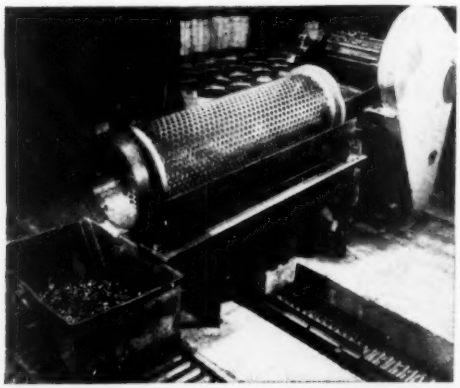
SPECIAL FEATURES: Sectional construction, permitting horizontal and vertical expansion of storage facilities as required or as spare labor is available.

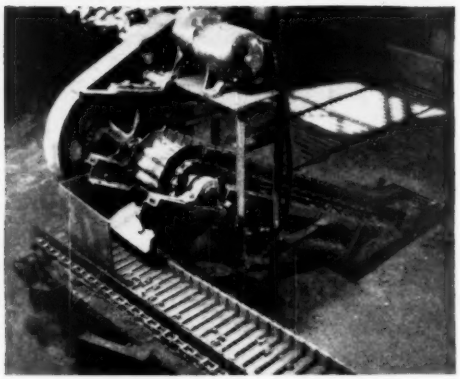
ADVANTAGES: Maximum storage space, easy to keep clean. Maximum visibility through use of meshed shelving, small framework members, and aluminum painting. Maximum flexibility—sections can be added or removed at will; individual shelves can be raised or lowered if required, even when loaded; entire assembly of sections can be moved by inching if aisle space requirements change. Neat, good-looking appearance. Maximum durability with minimum upkeep. All round accessibility, easy indexing and cataloging provided under classifications of stack, section, and shelf.

CONSTRUCTION DETAILS: For framework, seamless steel tubing, $1\frac{1}{2}$ inches in diameter, with $\frac{1}{8}$-in. wall. Tees, tees with one side outlet, crosses, and crosses with one side outlet, made of cast iron, are used for fittings. All fittings drilled and tapped as required for $\frac{1}{2}$-in. NC thread setscrews. Expanded metal used for shelving is $\frac{3}{4}$-in. mesh, flattened, 11 gage. Flattened expanded metal is superior to raised for this purpose, because of reduced friction when sliding heavier patterns in and out of shelves; scratching, chipping, and splintering of shelf-contacting pattern surfaces are also eliminated.

Cases in Work Simplification

Oliver Iron & Steel Corporation, Pittsburgh, is embarked on an improved methods program aimed at lowering costs of production. Here are methods changes that have brought about greater efficiency in production operations at this plant



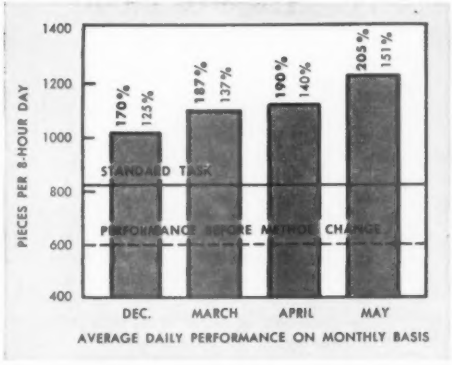


HOT NUT FORMING. Materials handling in connection with the hot-nut-forming operation was formerly a big problem. It involved loading of bars into an old manually loaded furnace and production in a semi-automatic machine, together with separation of the nuts from the slugs, transportation of the nuts to the threading department and slugs to a scrap car. It has been solved by the installation of a continuous furnace and an automatic nut-forming machine. On the discharge end, following quenching to cool the formed parts, finished nuts and slugs are lifted by a conveyor at the rear of the forming machine into a tumbling barrel or sorter. It is here that the nuts and slugs are separated. The slugs fall through holes in the sorter onto a scrap conveyor under the sorter and are automatically dumped into a chute leading to a scrap bin or a waiting scrap car. The nuts continue through the sorter and are dropped into a tote-box. This totebox rests on a roller conveyor on which it moves to the threading operation. Elimination of handling in this operation has increased the peak efficiency from 36 per cent under the old method to 80 per cent under the new method, a good part of which may be attributed to a decrease in manual handling.

ASSEMBLY OF GUY CLAMPS. Previously guy clamps (consisting of two plates, three bolts, and three nuts) were assembled in a continuous cycle established by a group of four workers. The first assembler picked up two plates, assembled them with the grooves inside, and inserted two bolts in the end holes of the plate. The second assembler started nuts on the first two or three threads of each bolt. The third assembler inserted a bolt in the middle hole of the assembly (in the reverse direction from the previous two bolts), picked up a nut from his tray, and started the nut on two or three threads of the bolt. The fourth assembler ran the nuts on the three bolts, one at a time, with a nut spinner.

In the new method, a table was constructed on which was placed a special type jig made to hold three bolts, head down, properly spaced to enable

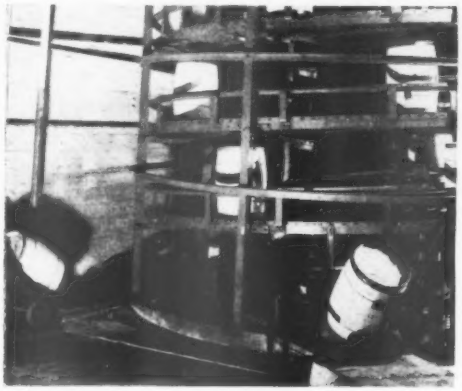
11 · Oliver Iron & Steel Corp.



the holes in the plates to fit over the bolts. A pneumatic impact wrench was installed. Using the jig and the pneumatic wrench, one assembler, performing the same operations in a slightly different sequence, now produces 36 per cent increase over former performance.

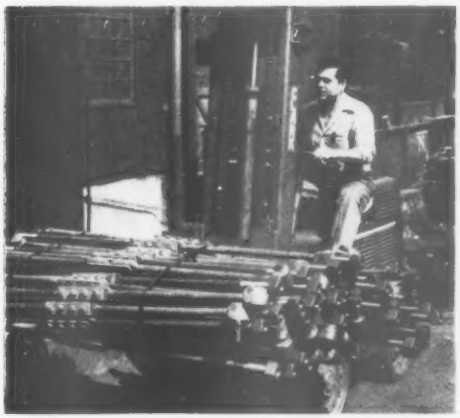
The assembled guy clamps are placed in cartons at the assembly table, pushed on down the gravity roller conveyor, marked with contents and weight, strapped and placed on pallet, and delivered to shipping dock or warehouse.

Actually, as may be seen above, guy clamp production has increased to 151 per cent of standard task (light-face figures) and 205 per cent of former performance (dark-face figures) through the efforts of good supervision, application of better methods, and worker cooperation.



SPIRAL CONVEYOR. Certain important light production operations are located on the second and third floors of a four-story building. Under former conditions, kegs and boxes containing finished packed material ready for shipment were taken by small hand trucks to the freight elevator. Daily volume of the kegs and boxes was so large that other elevator functions were sometimes neglected or seriously impaired. In addition, when material reached the first floor where it was to be shipped, it frequently took up so much room that shipping operations were considerably hampered.

To solve this problem, a three-story spiral conveyor was installed on which there are two entry points from each floor. Kegs and boxes are still brought to the conveyor by hand truck, but proceed to the first floor shipment area by gravity. At this point, large quantities of kegs and boxes awaiting shipment no longer interfere with shipping operations. The spiral conveyor itself forms a shipping storage area that will handle sufficient material for a carload of 40 tons. The single freight elevator is now free to handle the miscellaneous work for which it was originally intended.



RAILROAD GAGE RODS. The nature of railroad gage rods (weight, 35 pounds; length, 6 feet) makes them cumbersome to handle and transport. Formerly rods were hand-loaded on a flatbed truck, pushed to the railroad car, and piled individually inside the car. Loading a car required 24 man-hours of work.

Now, as the final operation is completed on the assembly line, rods are placed on two pieces of 4x4-in. lumber on skids. When the assembler completes 75 gage rods, a steel band is placed around each end of the bundle. Two bundles or 150 gage rods constitute a skid load. A fork lift truck moves under the loaded skid and takes it to the shipping dock. When shipping, a fork lift truck picks up each bundle and places it in the car, piling it at the desired height. Total time for loading a car now averages approximately 8 man-hours.

Graphic Cost Control System for All Management Levels

This standard-cost system is unaffected by changes in volume, provides equally effective control at 50 or 100 per cent of plant capacity

ALAN J. WOODFIELD • INDUSTRIAL ENGINEER, CONTINENTAL PAPER COMPANY RIDGEFIELD PARK, N. J.

TOP EXECUTIVES at Continental recently felt the need for a cost system that could tell them where they stood on every manufacturing order. Cost figures were needed that could be applied on a unit basis regardless of volume changes in operations.

New complications in competitive pricing, and increasing labor and material costs, these executives further realized, required closer cost control. It was no longer enough to know from periodic accounting reports that over-all operations were at a profit. They wanted a means to identify and rectify each operating loss hidden in that profit *before the loss continued.*

The answer was found in a *graphic* control system based on the theory of control of "marginal income." This income is defined as that portion of the total sales income which remains after all *variable* operating costs have been deducted. In substance, the system ferrets out and highlights the cost peaks where savings are to be found. It detects unfavorable trends in time to apply remedies. Conversely, it shows when operations are proceeding profitably.

As the system now functions at Continental, everybody in a supervisory capacity, from any one of 20 foremen up to top management, knows intimately the true cost of his operations. Moreover, with that knowledge goes not only a responsibility to each individual for keeping costs in line, but also the means to explain all variations under his control. This wide participation is a major factor in the effectiveness of the system.

Here are some specific achievements of marginal income control at Continental. It has:

1. Established an appreciation by all supervision of the interrelationship of *all* costs, to give a broader view of the problem. For example, it might prove the desirability of increasing the cost of supervision in one department by $2000 to get a net $5000 saving in cost of the product.

2. Given operating foremen and superintendents a true picture of costs, and a reliable tool for measuring cost performance.

3. Included indirect and service departments in such a way that only inefficiencies within their control are chargeable to them. For example, the power house is not responsible for the greater consumption of fuel caused by seasonal variations in temperature of the raw water supply for process uses.

4. Provided a means of cost control of raw materials of varying quality in a continuous-process industry. Where sharp "cut-off" points in processing from one order to the next cannot be fixed, such as here, the difficulty in measuring job cost and product cost has been overcome.

5. Strengthened the hand of quality control. A rise in cost of material, for example, can be traced to whether it was caused by poor quality of primary paper filler material (requiring more labor) or by excessive use of more costly covering material.

6. Permitted the sales department to quote intelligently on selling prices. There is no more conjuring of doubtful manufacturing costs, because they are based on total variable expense, unaffected by fixed expense which changes per unit with volume variations.

7. Contributed largely to reduction in waste of raw materials in the amount of $200,000 per year.

8. Enabled the company to hold the line on the total variable cost per ton of product despite other inflationary tendencies.

The over-all result is a better product at lower comparable cost, which benefits employees, management, customers, and stockholders alike.

Administrative Simplicity

In the search for a suitable cost control system, certain fundamental administrative features were postulated. They called for a cost system with a simple, over-all control. This system should reach the objectives with a minimum of forms, and arrive at executive desks with the closing of each 4-week fiscal period. Marginal income control solves these problems.

Under marginal income control the bulk of the month is spent in investigation, correction, and improvement; paperwork is kept to a few days. A minimum staff of two employees, giving only a part of their time to this system, keep it a live, vital control.

Efficiency Barometer

What is the marginal income approach to effective cost control? It is an approach to the cost-to-selling price relationship whereby the *true* path over which a company's profit travels under shifting volume is determined.

Most cost systems commonly measure a company's efficiency by its percentage of profit to sales. With each change in sales volume, however, this percentage changes, so that it is impossible to tell whether at any current volume a company is operating profit-wise more effectively than at any other volume. Hence this changing per

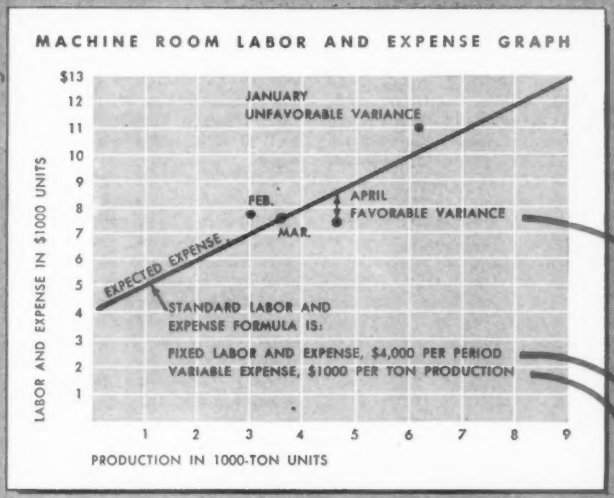


Figure 1. Machine Room Labor and Expense Graph. Periodic plotting of actual costs for each department for any given volume of production shows the foreman quickly how they compare with the expected "standard" expense.

MANUFACTURING VARIANCE REPORT

PERIOD: APRIL TONS MADE: 4500

	1	2	3	4	5	6
DEPARTMENT	VARIABLE EXPENSE PER TON	TOTAL VARIABLE EXPENSE	FIXED EXPENSE	STANDARD	ACTUAL	VARIANCE
METHOD OF COMPUTATION		TONS x (1)		(2) + (3)		(5) − (4)
MACHINE ROOM	$1.00	$4,500	$4,000	$8,500	$7,600	$900
RE...						
TOTAL ALL DEPARTMENTS	$30.00	$135,000	$150,000	$285,000	$315,000	$30,000

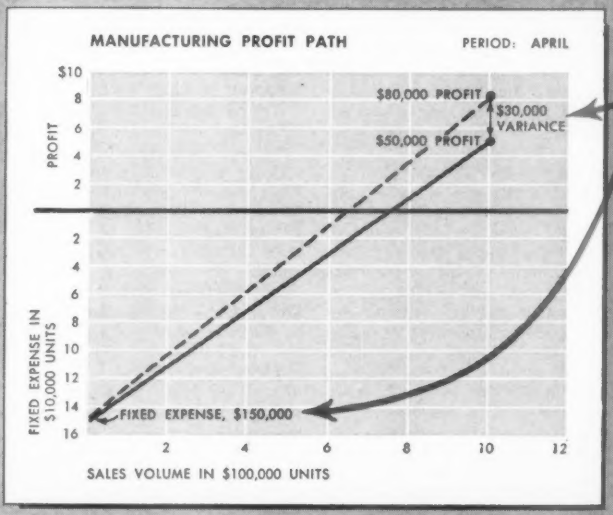


Figure 2. Manufacturing Variance Report. Statistical summary of all departmental labor-and-expense graphs is an intermediate step to graphic visualization of the over-all manufacturing profit path.

Figure 3. Manufacturing Profit Path. Effect of the total manufacturing variance on manufacturing profit is shown by a typical graph of profit paths with and without variance. Reduced variance means greater profit.

centage in the face of shifting sales volume proves inadequate in measuring plant efficiency.

For example, an 8 per cent profit at $1,000,000 volume may represent better plant efficiency than a 10 per cent profit at $1,500,000 volume. So far as figures go, the latter profit is greater, but management has no way of knowing whether the same level of manufacturing efficiency prevailed at both levels of volume. Greater volume might have compensated for lower manufacturing efficiency to show more profit. The marginal income approach, however, gives a measurement of plant efficiency at all practical operating levels. It assures management that maximum profits are being obtained at any operating level.

These results are achieved because of a basic difference in the marginal income method of cost control. This difference centers on distinctive treatment of "fixed" operating costs that runs counter to common conceptions of how they ought to be handled.

It is in the failure to allocate fixed costs properly that most cost systems distort the facts. For throwing an expense that does *not* vary into groups of expenses that do follow a variable relationship with volume, creates a different unit cost at each level of operation. What is true at 80 per cent of capacity is no longer true at 50 per cent. The reason—at 80 per cent fixed expense is spread over more units of production. This lowers the total cost per unit, making it appear that efficiency is higher, when actually the change is due to the sales department shooting more sales into the plant. Likewise, if the plant has changed in operating efficiency, its influence on profits is mistakenly mixed up with the effects of changing volume.

How It Works

The marginal income approach corrects these errors two ways:

1. Marginal income says, let us stop mixing up manufacturing efficiency with the changing profit resulting from sales efforts. Let us find the unit manufacturing cost that varies with volume and that should prevail with good manufacturing practice at any practical manufacturing level. Then we can *always measure* our actual manufacturing cost with this standard to maintain top efficiency at all levels.

How to do this? Since it is the fixed expense that changes the unit cost at various volume levels, the method is to remove temporarily the fixed expense from the unit manufacturing cost. The remaining unit cost will be a constant, applicable at all levels of sales volume. Control is provided by surveillance of the variations from this constant.

2. The marginal income system speaks of a "marginal income." This is *not* a profit, but rather an intermediate step in profit determination in which only variable expense (and not fixed costs) has been removed from total sales. Thus fixed costs must eventually be deducted from marginal income to arrive at profit.

Marginal income, then, is the money remaining after paying the out-of-pocket operating expense due strictly to volume. Such being the case, the ratio of marginal income to total sales becomes *an index of manufacturing efficiency*. Watch how this works in an example of the computation of profit by the marginal income method as compared with that of conventional cost system methods. (See the first example on page 85.)

Now, let us suppose that volume has doubled and that manufacturing efficiency has remained the same. (See second example, page 85.) The "MI ratio" is the *same* in both cases of differing profits to sales ratio. The conventional method provides no measurement to tell management of the same manufacturing efficiency, but actually misleads by showing a higher percentage of profit-to-sales ratio which might cause it to believe the factory did a better job. Thus we see how the marginal income method shows that manufacturing efficiency has remained the same despite changing profits.

To demonstrate this point further, let us examine the opposite case, where, as volume increases, manufacturing efficiency has dropped. (See third example, page 85.) Here the conventional cost method has failed to point out to management that manufacturing inefficiencies have entered the picture. The same percentage of profit-to-sales ratio prevails as at the lower volume shown in the first example. However, this drop in efficiency is revealed by the MI ratio, which has dropped from 40 to 30. It must now be evident that *the MI ratio will remain the same at all levels of volume provided manufacturing efficiency is kept the same. By the same token, the MI ratio will rise or fall with corresponding increases or decreases in manufacturing efficiency.* The MI ratio, therefore, offers a reliable means for control of manufacturing costs.

Graphic Reports

To determine marginal income standards it is necessary, as already defined, to separate the "volume" costs from the fixed expense. This calls for a thorough auditing procedure involving careful analysis and segregation of these costs over chosen fiscal periods. Also, it requires a breakdown by departments and operations. These phases of the job, and they are important ones, belong to the accountant. What is of more interest here is the application of the results of the accounting procedures by the manufacturing personnel.

At Continental these results are handed over to manufacturing personnel in the form of simple graphs like Figure 1. (In this graph and others to follow hypothetical figures indicative of actual experience have been used.)

This graph, representing the expense behavior at any level of activity of the machine room at Continental, is typical of those for all its other departments and operations. It shows the cost behavior line rising with volume, as illustrated, from left to right. The formula for this department is stated as so much fixed expense each period which does not fluctuate with volume, and so much expense that rises or falls directly as volume changes. As volume increases, the *expected* labor and expense costs can be found on this line.

Against this standard of "expected" costs are plotted the actual labor and expense costs for consecutive monthly (4-week) periods. Thus good or poor operating performance is periodically revealed by the deviations, or variances, from standard expectancies *at any volume of production*. Nor are these standards static. The standard graph is recomputed annually to reflect permanent changes caused by technological improvements, methods improvements, and so on.

It will be noted that starting with January the actual expense in the machine room was above the line indicating there was inefficiency. Management thereupon went to work on this department and im-

EXAMPLE 1

CONVENTIONAL METHOD		MI METHOD	
Total Company Sales	$1,000,000		$1,000,000
Less Material Costs	300,000		300,000
Less All Labor and Expense	500,000	Less Only Variable Labor and Expense	300,000
Profit	$200,000	Marginal Income	$400,000
Profit-to-Sales Ratio	20%	Less All Fixed Expense	200,000
		Profit	$200,000
		MI Ratio	40%

EXAMPLE 2

CONVENTIONAL METHOD		MI METHOD	
Total Company Sales	$2,000,000		$2,000,000
Less Material Costs	600,000		600,000
Less All Labor and Expense	800,000	Less Only Variable Labor and Expense	600,000
Profit	$600,000	Marginal Income	$800,000
Profit-to-Sales Ratio	30%	Less All Fixed Expense	200,000
		Profit	$600,000
		MI Ratio	40%

EXAMPLE 3

CONVENTIONAL METHOD		MI METHOD	
Total Company Sales	$2,000,000		$2,000,000
Less Material Costs	600,000		600,000
Less All Labor and Expense	1,000,000	Less Only Variable Labor and Expense	800,000
Profit	$400,000	Marginal Income	$600,000
Profit-to-Sales Ratio	20%	Less All Fixed Expense	200,000
		Profit	$400,000
		MI Ratio	30%

provement was shown by March, where the actual cost fell directly on the expected cost line. In April this efficiency drive carried the point below the line to the extent of $900 under expected costs.

Graphing *expenses* for trends, Continental has found, uncovers behavior patterns unsuspected in an identification of fixed expenses only from conventional statistical reports. For example, direct labor (which is generally assumed to vary in direct proportion to production) was found to contain portions of expenses that did not vary with volume. By graphic means these portions were clearly spotted and evaluated, and steps taken to bring direct labor back as close to a variable basis as possible.

From the basic expense behavior graph for each department, a summary of all department manufacturing experiences is developed as shown in Figure 2. Here we can observe the graphic behavior and efficiency of each department translated statistically.

These statistics make possible the graphic visualization of the over-all manufacturing profit path of the company as shown in Figure 3. It is here where the cost-to-selling price relationship is reunited. On this graph path 1 is the actual "period" experience. Starting at $150,000 fixed expense, the marginal income (derived by subtracting variable costs from sales) is applied first toward covering this fixed expense. This it does at a sales volume of about 7½ million dollars. Above that break-even point the rest of marginal income goes directly toward profits.

Path 2 shows where the profits would have landed had there been no "manufacturing variance" in that period. The difference between paths 1 and 2 at the designated sales volume is determined from the total variance in the summary variance report, Figure 2.

The marginal income system of cost control involves other forms designed to reveal variances that will affect profitable operations. In addition to those for manufacturing labor and expense, variance reports are designed for control of materials, sales, and administrative budget. Sales-wise, all Continental products are expressed as ratios indicating their marginal income content. Thus, a paperboard which has a "30 MI" ratio means it produces $30 of marginal income for each ton sold. Another board at "15 MI" obviously requires double the tonnage sold to contribute the same marginal income. Sales control is effected by tabulating the amount of marginal income sold.

Scheduled Supervisory Review

But the best of systems are inert until used for interpretation of experience and for guidance to remedial action. For this purpose four control meetings are held each 4-week period covering (1) labor and expense, (2) materials, (3) sales, and (4) budget control. Each item is treated separately, and each meeting is attended only by the members of management, from the level of foremen to the top executives, who are directly concerned with the correction of the variances.

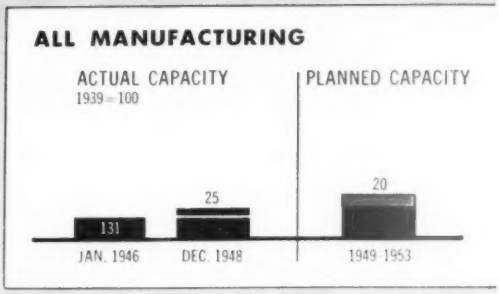
During these discussions, methods and studies are suggested to help solve particular cost problems. Individual assignments are made for work to be done in such areas before the next meeting.

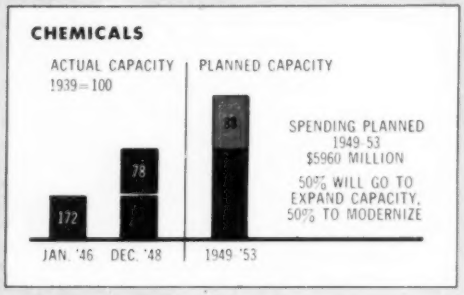
The dispatch with which deviations from standard can be corrected is evidenced by the schedule followed by Continental for the issuance of seven major control forms. Beginning with the "labor and expense variance" report within 5 days after the end of the period, it concludes with profit graphs 3 days later. Thus, while many companies are still closing books for the month, Continental has already completed and issued its control form, investigated variances, and held its cost and budget meetings.

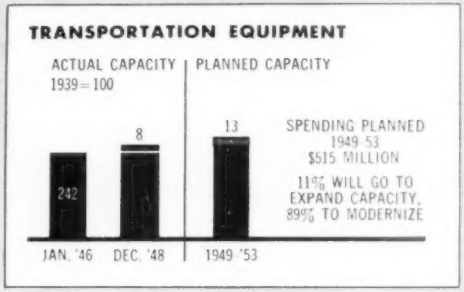
EXPANSION AND MODERNIZATION

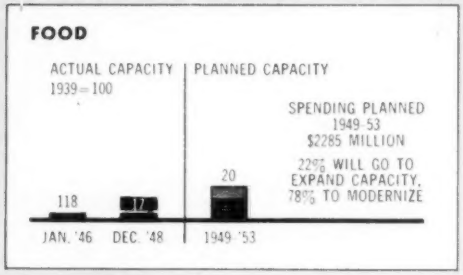
What Industry Plans to Spend (1949-53)

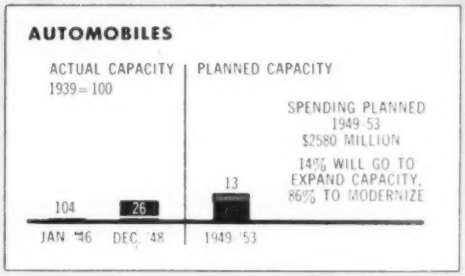
Based on a survey by the McGraw-Hill Department of Economics, these charts reveal for the first time industry's five-year plans to invest in new plants and equipment









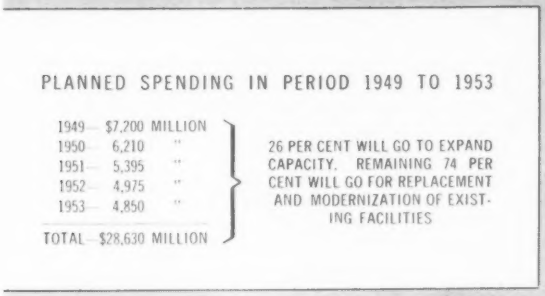


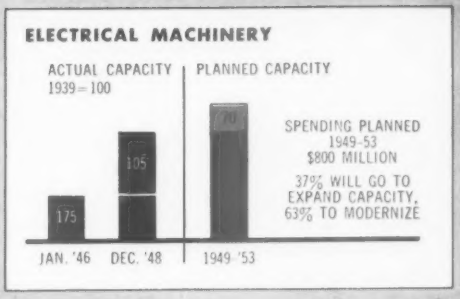
Industry's Planned Expansion Answers the Truman Challenge

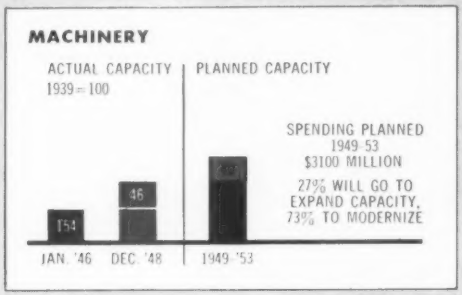
TRUMAN CALLED for an increase of 3 to 4 per cent in industrial production plus jobs for a million more workers in 1949. *That manufacturing industry will meet this challenge is revealed in its plans for capital investment over the next five years*—plans formulated long before the Truman program was announced.

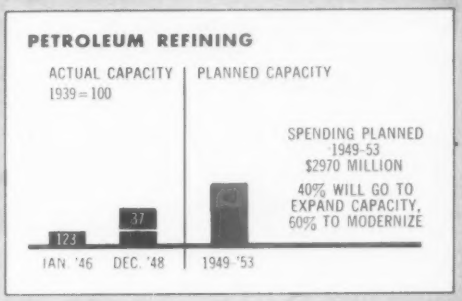
These are conservative—*minimum*—plans. Barring depression or punitive taxes, manufacturers will spend *more* than the $28 billion now planned for 1949-53.

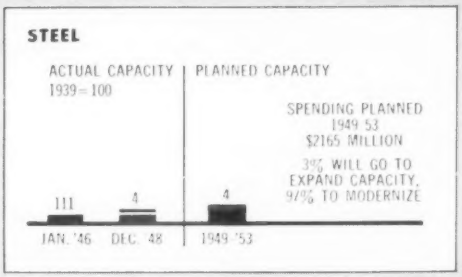
Significant is a change from building of new capacity to replacement and modernization of existing facilities. Last year 42 per cent of capital funds went to expand capacity; future plans call for 24 per cent. This anticipated tapering off of post-war expansion programs has not led to a drastic

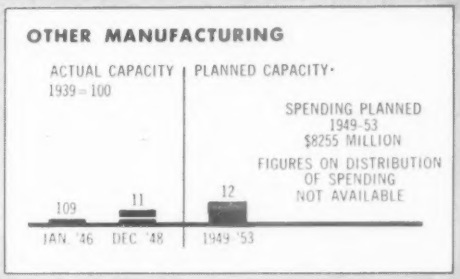

PLANNED SPENDING IN PERIOD 1949 TO 1953
1949— $7,200 MILLION
1950— 6,210 "
1951— 5,395 "
1952— 4,975 "
1953— 4,850 "
TOTAL—$28,630 MILLION
26 PER CENT WILL GO TO EXPAND CAPACITY. REMAINING 74 PER CENT WILL GO FOR REPLACEMENT AND MODERNIZATION OF EXISTING FACILITIES











decline in plant and equipment spending; modernization programs are taking up the slack.

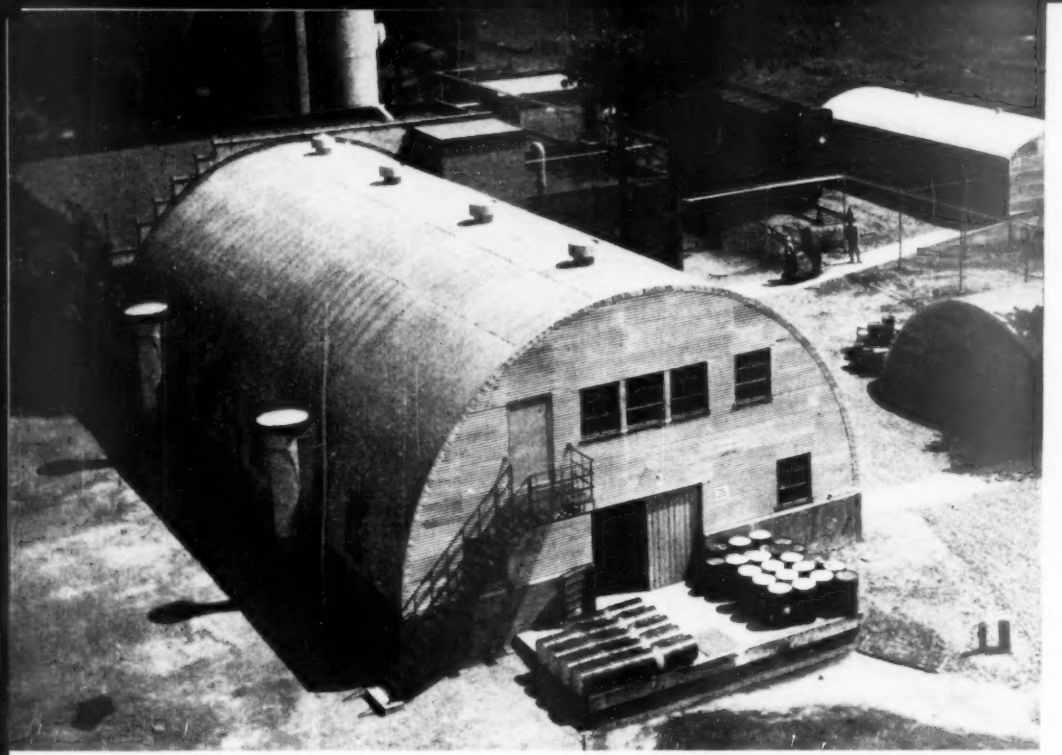
Since 1939 manufacturing industries have increased physical capacity over-all by 56 per cent (see chart). Plans call for another 13 per cent on top of this by 1953. Added efficiency due to modernization and replacement plus increased physical capacity make the 3 to 4 per cent goal no problem.

What about steel? The Truman program threatens industries whose product is in short supply and suggests that government may move in and start competitive manufacturing if expansion is not stepped up. Steel's small expansion plans apparently justify this viewpoint. But in early 1921 the identical criticism was leveled at steel. By that year's end, production had fallen to 34.5 per cent of capacity. In the depression, the opposite complaint was made—that too much unused capacity was being maintained. The Temporary National Economic Committee went so far as to say that over-expansion in steel was one of the major causes of the depression.

The fact is that steel has expanded on top of already enormous capacity. This expansion, plus extensive modernization now planned, will bring steel into line with "all manufacturing."

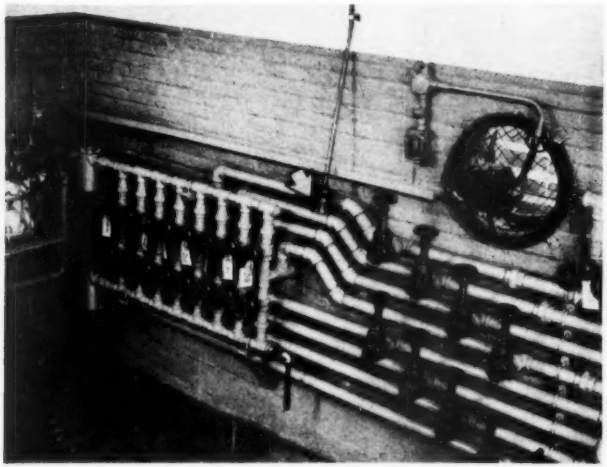
But how about jobs for a million more workers in 1949? Manufacturing must share responsibility with the rest of the economy. Spending over $7 billion for capital equipment in 1949 will contribute substantially to building higher levels of employment. And increased production will create more jobs in service and distribution industries—as it always has.

Unless factors beyond their control throw manufacturers' plans out of line, the challenge to produce more will be met face on—and with success.

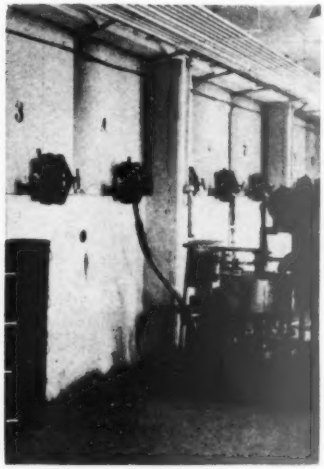


DECENTRALIZATION OF OPERATIONS WAS OF FIRST IMPORTANCE IN ELIMINATING CONCENTRATION HAZARDS

New Plant Is Protected Against



VENTILATION of pumphouse removes solvent vapors. Fan shuts off when carbon-dioxide system operates through funnels (arrow)



PACKAGING operation also uses explosion-proof power equipment

AND LOCALIZING EFFECTS OF POSSIBLE ACCIDENTS

Solvent Hazards

In a plant of this kind, every possible hazard must be anticipated two ways —prevention of explosion and fire, and then protective measures to check them should they occur

EDWARD G. HART • PLANT ENGINEER, THE ARCO COMPANY, CLEVELAND

PROVIDE MAXIMUM PROTECTION against hazards of flammable solvents and ignitable materials! This stern objective keyed all engineering and construction specifications of Arco's new lacquer manufacturing plant.

Adding realistic stimulus to making this plant the latest word in its field in operational safety was the background of the destruction by explosion and fire of the two-story frame structure it was to replace. Small wonder then that primary emphasis on every detail of plant design dealt with the safety factor.

The new facility is not a large plant in the accepted sense of the word. But it incorporated engineering principles and refinements for meeting the same problems that might occur on any scale.

The new plant layout, occupying a 2-acre plot, comprises five *separate* buildings, quonset-type, which are utilized respectively for (1) lacquer manufacturing, (2) blending of lacquer thinners, (3) nitrocellulose storage, (4) cleaning portable tanks and other equipment, and (5) housing pumping units. Quonset-type structures were chosen largely because of their availability and economy and their adaptability to the requirements.

A sixth unit consists of an open-air tank farm located on a triangular-shaped plot at one extremity of the building layout. It is used for storage of solvents delivered by railroad tank car on an adjacent siding. A seventh brick warehouse unit, not new, adjoins the new plant, but involves only ordinary paint container storage problems.

In every case, each new unit of operation is separated from the others by a distance ranging from 30 to 50 feet. By this physical decentralization and segregation of operations the undesirable concentration of hazards within a single structure was eliminated. Also, the effects of an unforeseen explosion or fire are thereby localized and minimized.

But the decentralization of unit operations introduced another problem, that of safe and efficient materials handling. Second only to the consideration of operational safety, this problem influenced other features of plant design for attaining an integrated flow of raw and in-process materials at lowest possible handling cost. Chief of these features is the method of handling solvents volumetrically from a central pumphouse as they are pumped either directly to 26 mixing and dispersion tanks in the lacquer building or to lacquer thinner tanks in the blending building.

Other materials handling problems demanded ingenuity and care in structural design. For example, the lacquer building, largest of the group and measuring 80x40 feet, was elevated on a concrete wall 4 feet high to secure greater overhead clearance. This

LOADING of mixing tanks is done from spark-proof mezzanine floor. Fusible link holds cover open

made possible the elevation of all the tank equipment back-to-back in two rows in the center of the building, and the construction of a parallel concrete mezzanine platform along opposing sides for charging raw materials into the tanks. Total capacity of the tanks is 22,000 gallons. The charging platforms are served from ground level by a *hydraulic* elevator of 4000-lb. capacity. Moreover, elevation of the tanks has simplified drawing off the finished product into shipping containers. The drain valves at the bottom of these tanks are 5 feet above the first floor level. This operation is carried on in a concrete-enclosed room under each mezzanine platform.

Movement of the basic raw material (nitrocellulose) to the hydraulic elevator was planned so as to utilize gravity from the moment of its arrival into storage until delivery to the elevator. Nitrocellulose is unloaded at the rail siding adjoining the storage building directly onto a platform at car-door height. From here it is taken *down* a ramp at one end of the storage building. At the opposite end, the material is hand-trucked *down* an outdoor ramp leading to the hydraulic elevator in the lacquer building. All materials handling within any building is done with hand-operated lift trucks equipped with non-sparking wheels and fittings.

Precautions against conditions that might lead to explosion or fire were carefully considered.

Special Electrical Precautions

In general, each of the five roof structures was spray-coated internally to ¾-inch thickness with fire-resistant insulation, made of a combination of rock wool and asbestos. All five buildings also are equipped with explosion-proof electric wiring, light fixtures, and control apparatus in conformance with Class 1, Group D code requirements. Power supply for all motors is 220-volt, three-phase, 60-cycle current. Each motor in the lacquer plant is equipped with a lock-in type pushbutton control station, conveniently located, which activates a magnetic starter situated in the adjoining brick warehouse.

To minimize static hazards, flooring on both levels of the lacquer building was topped with specially compounded concrete containing an iron hardener which has imparted conductive and non-sparking qualities to the surface. All floors in this and the other four structures are electrically grounded for dissipation of static. On ground floors of every building, a number of copper rods extend from the iron-hardened surface deep into the ground. On the mezzanine floor of the lacquer plant, copper strips have been laid in the concrete surface and these, in turn, are grounded into the structural steel of the building. Tanks, electrical equipment, and structural steel are also adequately grounded.

To prevent the accumulation of heavier-than-air explosive solvent vapors that settle to the first floor of the lacquer building, four wall-mounted ventilating exhaust fans at floor level were provided which vent to the outside air in vertical stacks rising about 15 feet above the ground. These fans provide a complete air change every 3 to 4 minutes.

Vapor expansion and contraction in the solvent storage and blending tanks are handled by flash-arresting vents and liquid level indicators. These vents achieve positive flame stoppage and explosion prevention by passage of vapors through a series of flat and corrugated high-purity, corrosion-resistant aluminum plates before exhausting into the atmosphere. Likewise, in case of external fire this metal grille absorbs and dissipates resultant heat quickly to reduce the temperature of the vapor below its flash point. The grille is deep enough to resist any burning through, yet also designed for minimum resistance and interference with tank breathing.

Housings and covers of these flame arrestors are semi-steel castings. Because of their high melting point (about 2300 deg. F.) and retention of strength (30 to 90 per cent) at 1200 deg. F., they offer considerable heat resistance and protection to the aluminum arrestor bank, even when subjected to intense heat. Simplified design of these arrestors permits easy and quick inspection and maintenance. Similar units have also been installed on the large solvent storage tanks on the tank farm.

A second line of defense against any catastrophe has been set up in the protective measures against any fires that might occur. Three automatic sprinkler systems, each engineered for high-hazard usage, protect the lacquer building, warehouse, and the nitrocellulose storage building respectively. The first two systems are of the wet type. The third is a dry system incorporating heat-actuated heads; its control valve is located outside the building. All three systems are fed by 8-in. underground water lines.

All mixing and dispersion tanks are equipped with self-closing covers held open by a fusible link. Should a flash in a tank develop, the link melts and causes the cover to drop, thereby smothering the fire.

Supplementary fire-extinguishing apparatus in the lacquer plant includes four manually operated, 75-ft. carbon-dioxide hose racks supplied by four 50-lb. cylinders. The pumphouse is equipped with a total-flooding, automatic carbon-dioxide system incorporating electrical power cutoff and automatic closures. Control and supply of this system are located in the adjoining warehouse. Structures for thinner-blending and equipment-washing have an air-foam system employing an exterior hydrant hose station.

Safety for Storage Tanks

Three safety provisions mark the protection of the solvent storage tank farm. First, the entire plot is enclosed by a concrete dike that has a holding capacity one and a half times the volume of the farm's 19 tanks. This dike will halt any blaze resulting from a tank rupture and solvent spillage.

Second, the pumphouse has been made an integral part of the dike wall. Functionally, the pumphouse is equipped with four rotary pumps, two for transforming solvents from tank cars to storage tanks, and two for pumping solvents to process units. Entrance to the pumphouse was made at the same height as the dike wall, so that any flooding caused by pump failure is confined within the dike.

Third, extinguishment of a fire within the dike is accomplished by a chemical foam-generating system for single-line service. This set-up utilizes a generator with a single hopper into which the foam generating chemical is introduced. The generator and powder are stored at a second hydrant hose station outside the dike area.

This is the combination of engineering features that provides at economical cost a wider margin of protection against fire and explosion hazards, it is believed, than has been attained heretofore in a plant of comparative size operating on a similar scale.

SOUVENIR BOOKLETS, SOME ELABORATE, SOME SIMPLE AND INEXPENSIVE, REMIND GUESTS OF OPEN HOUSE VISIT

How to Plan and Run Open House

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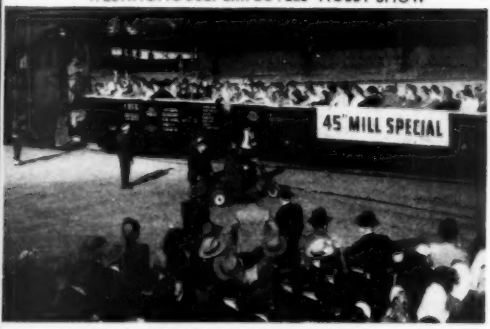
INTERNATIONAL HARVESTER: THE ROUTE

PITNEY-BOWES: PRIDE IN EXPLAINING

WESTINGHOUSE: EMPLOYEES' HOBBY SHOW



CARNEGIE-ILLINOIS: BIG-PLANT TOUR

HOW TO PLAN AND RUN OPEN HOUSE

INDUSTRY'S NEED to make itself better understood by the public and by its employees has given the plant visit and the open house a significant place in many companies' community relations programs. Because visitors to a plant are in a friendly, receptive frame of mind, the occasion is an ideal opportunity for the company to present important facts about its operation and policies. At comparatively small cost, these events achieve many important goals. For example, the open house and the plant visit:

Give employees and their families a renewed sense of pride in the company. Almost without exception they result in increased production.

Advance Planning

Some plants survey the attitudes of their employees and communities before engaging in this kind of activity. Established agencies can help management find out what employees think of their jobs, what impressions they have about ownership, profits, and employee welfare programs, and how the plant rates in the minds of the public. Advance surveys help guide the planning so that messages deserving prime emphasis receive the proper attention.

The great number of details that must be attended to require at least two months' planning and work. In some giant affairs, planning has been started six months in advance of the event, and final preparations, such as building walks, providing for safety and comfort, and arranging transportation, have kept the plant busy for a solid six weeks.

Steering Committee

Initiation of open house or family day plans comes from top management, and top management support is essential throughout every stage of the development. Usually one executive is appointed to coordinate all the efforts, and in some cases he is assisted by two or three other executives who comprise a steering committee.

At the very start, certain important decisions must be made by the steering committee. The first is to choose a time for the affair. Many plants prefer a time in the spring because it ties in with spring cleaning. This season, or the fall, is often selected for strictly employee events in which the plant tour is combined with an annual picnic. Care should be taken that the date does not conflict with other community affairs that draw the public away.

If possible, it is good to select a date that is important in the history of the plant, such as an anniversary of its founding. Sometimes an open house can be built around the dedication of a new building, the launching of a new product, or the completion of some important project. A significance to the date provides additional possibilities for promotion.

Depending upon the size of the community, an open house may run from one day to two or three weeks. In large communities it is often desirable to allocate certain times for certain groups, reserving the plant one day for representatives of neighboring industries or important customers, another day for

Let future job seekers see that the company is a good place to work.

Give suppliers and customers a renewed appreciation of the company as a good one with which to do business.

Replace the notion of the company as a profit-grasping legal entity with the idea of the company as a hard-working member of the community and a good neighbor.

Correct misconceptions about machines, profits, employee welfare.

Win important friends and spokesmen and lead to increased participation in community affairs.

There are two common forms of plant hospitality programs that may be used to accomplish these objectives—the open house, and special visits.

Special visits vary greatly with the circumstances of the moment as regards both the company and the visiting group. With few exceptions, it is best to have such groups homogeneous—that is, all teachers, all clergymen, all suppliers, and so forth—and, obviously, all planning must be based on a recognition of the special interests and attitudes of the group. For this reason no attempt will be made here to describe the planning and execution of special visitations. The discussion that follows will be confined to the open house or family day program.

employees and their families, and the remaining time for the general public.

A small family-day event usually lasts only one day. When it is combined with another event for employees, such as a picnic or ballgame, it may last only half a day.

A second major decision the steering committee must make is in regard to how much money can be spent for the affair and how the expenditures should be cleared. Successful events have been conducted for as little as 50 cents a guest. Generally, however, costs run nearer to $1 a guest, and sometimes considerably more. One plant of about 3000 employees, entertaining 8000 guests, gives this breakdown:

Souvenir	$0.25
Candy for children	.03
Refreshments	.13
Publicity	.05
Door prizes	.02
Music, signs, transportation, display, decorations, etc.	.14
Total	$0.62

Further information on cost, as well as other salient features of open houses, will be found on the chart following page 96. The chart is based on a FACTORY survey of open house practices in 47 companies.

The open house budget will be strongly influenced by related decisions on how big the affair is to be, how much advertising will be employed, whether refreshments are served, what sort of souvenirs will be distributed, and whether elaborate special displays will be constructed.

In addition to establishing a master budget, the steering committee draws up a master time schedule for preparations—a flexible plan that can be refined and expanded as other committees get into operation. An important element in this plan, and a job for the steering committee, is notification of supervisors and employees of all major developments. The master time schedule includes a general meeting of all supervisors at which the over-all plans are announced. In addition, supervisors receive frequent notifications as important decisions are made, so that they are in a position to answer questions from employees and to contribute suggestions to operating committees. Letters and bulletin board announcements to employees are featured on the master schedules, and advance information on these announcements are given to supervisors.

Selecting Committees

Selection of committee chairmen is usually a job for the steering committee. While the work of putting together an open house or family day can be fairly logically broken down, most plants prefer to select committee chairmen on the basis of their experience and background in getting various jobs done rather than on a strictly mechanical division of responsibility.

Before the committee representatives are brought together, the steering committee prepares a complete report of its decisions, including a description of the jobs assigned to all the committees. The first meeting can then be a total review of the job ahead and a clear definition of responsibilities. It is a good idea to make it possible, right from the start, for committees to exchange ideas laterally rather than always through the steering committee or the coordinator. Thus, for example, if the man in charge of displays wants to use a portion of the yard that might otherwise be used for parking, he can clear his problem directly with the man responsible for traffic.

Provision is made for frequent progress report meetings of the committees so that everyone knows what everyone else is doing.

One way of achieving teamwork throughout the entire plant is to stimulate volunteer work for the committees. This can be done through foremen and supervisors or through the usual media of reaching the employees—bulletin board announcements, letters, or the plant paper. In order to get ideas from employees, the steering committee should be sure that they are informed on the purposes of the various committees. Employees can then use the suggestion box for communicating ideas to the committees, and perhaps awards may be offered.

Jobs to Be Done

At the start of planning for the open house, any number of tasks, large and small, will come to mind as essential for proper participation and for the comfort of the guests. However, most of these can be classified under the following headings and assigned to a particular committee: Promotion, invitations, plant preparation, the tour, special displays and features, guides, traffic, hospitality, special arrangements, souvenirs, properties, information, and follow-up.

CONTINUED ON NEXT PAGE

1 • PROMOTION

Good promotion is vital to the success of any open house program. It can include publicity, advertising, coordination with community organizations, and promotion through the employee media.

The local papers are a prime medium for general promotion. Several weeks in advance of the event, they are given an announcement story with details on the outstanding features planned for the event. If the event is tied in with a commemorative ceremony of some sort, stories are developed on that also. Design advertisements to invite the public and tell them about some of the special treats in store for them. Near the day of the event, release news on any special transportation and parking facilities.

An advance press party at which news is released for publication on the date of the event brings big dividends. So, too, does an advance tour for newspapermen, or a special gathering on opening day.

During the event itself, see that photographers rove the plant taking newsworthy pictures. Maintain a pressroom to provide the papers with information.

Radio is a second major medium for promotion. Like the papers, local radio stations should be provided with newsworthy advance stories. Invite representatives from local radio stations to special press parties. If the budget permits, spot announcements on the radio will help draw attendance. If a special event, like a dedication or an award ceremony, is to be held during the event, try to interest local stations in providing broadcast time for it, especially if the celebration is of community-wide significance. In addition, certain regular programs on the local stations can make use of on-the-spot reports or interviews during the event. If a national radio show is to be in town during the event, arrange to have it originate from the plant. Opportunities such as these can be turned up only if radio stations are consulted early in the planning stages.

A variety of other community media are used to promote the occasion. Placards are placed in store

2 • INVITATIONS

Written invitations supplement bulletin board announcements, publicity, and advertising. Employees receive invitations and tickets directly through their foremen or supervisors, or in a personalized letter from the plant manager. If the latter method is used, notify the immediate supervisor in advance of the mailing of the plant manager's letter. Employees, in turn, can be encouraged to extend invitations to their families and friends.

In plants where it is necessary to keep a record of all visitors and to provide guest badges, ask employees to signify whether or not they are coming and who will accompany them. This facilitates advance preparation of registration. Another method is to provide all guests in advance with a stringed tag on which they write their names. A perforated stub on the tag, which also carries the name of the visitor, can be torn off and collected at the gate, thus serving both as a ticket and as a record of the people attending.

Invitation lists are made up to include opinion-forming groups in the community, such as clergymen, school teachers, lawyers, press and radio, nearby stockholders, business and union officials, youth leaders, service club leaders, and public officials. Often these lists can be obtained through central organizations of the groups. Many plants make a practice of sending special invitations to annuitants. Whether or not representatives of neighboring industries are invited to the affair, they must at least be notified so that they can take any necessary action to prepare for the arrival of large numbers of people in the area.

Invitations take several forms—a formal card, an illustrated brochure listing some of the major features at open house and family day, or a personalized letter from the plant manager. Or the letter may be signed by a management representative who is especially well known to the group being invited. For

CONTINUED ON PAGE 96

CHECK LIST FOR OPEN HOUSE INVITATIONS

Employees' families and friends

Educational groups: Superintendents of schools, principals, college faculty members, teachers, college and high school students, parent-teacher associations, boards of education

Civic leaders: Boards of trade, chambers of commerce, municipal and community functionaries

Business groups: Dealers, suppliers, customers, mercantile associations, employment agencies, conventions visiting city

Fraternal groups: Service clubs (Rotary, Kiwanis, Lions, etc.), veterans groups, lodges

Cultural groups: Forum clubs and the like

Youth groups: Boy Scouts, 4-H, Junior Achievement groups

Other professional groups: Clergy, doctors, nurses, lawyers, bankers, merchants, press, radio, engineering and other professional societies

Local or regional stockholders

Groups representing other industries

General public

When an invitation is to be extended to a specific group (rather than including it as part of the general public), no opportunity should be overlooked to stimulate interest and attendance by making the invitation through personal friends or through employees who are members of the group. Additionally, every group listed above is a prospect for a special visit as well as for general open house.

windows, and many merchants are willing to dress their windows with congratulatory messages and special displays of products manufactured in the plant. Placards can also be placed on telephone and streetlight poles, and arrangements made for streamer banners across the streets. Theaters are sometimes willing to flash announcements on the screen between the features and may also show educational motion pictures prepared by the company. In some cases, public vehicles are willing to carry stickers announcing the event. On the days of the event, be sure streetcars or busses that pass the plant carry signs.

If the event is to be of any duration, use outdoor advertising to attract motoring visitors to town. Prepare stickers for company vehicles and employee automobiles. Use also on correspondence.

Civic and educational organizations may be willing to conduct promotions of their own supporting the plant's promotion. The superintendent of schools, for example, may assist in arranging visits for teachers and students. Service clubs may be willing to use their facilities for announcing the event. The Westinghouse plant at Derry, Pa., made arrangements with the local music organizations and the fire companies to participate in a street parade on the morning of its family day. The local businessmen caught the spirit of the occasion and advised residents, especially those along the parade route, to display street flags. They printed special posters congratulating the plant on its progress and displayed them in their show windows, decorated for the occasion. Local merchants also prepared a float for the parade.

Promotion among the employees includes frequent bulletin board announcements pointing out special features of the affair, and perhaps special displays in areas of heavy traffic, such as the entrance ways and the cafeteria. Use the plant paper or magazine also to reach both the employees and their families. In many instances the union paper has been liberal in its support of the event.

If the occasion warrants, additional publicity may sometimes be obtained through trade journals.

example, if an executive of the plant is a member of the school board, he may be the one to sign letters of invitation to school administrators.

Invitations should indicate that children under a certain age must be accompanied by adults. They are mailed one or two weeks in advance and contain reply postal cards or some other convenient reply mechanism if it is desirable to know beforehand who is coming in order to expedite registration or make any special preparations. They also contain tickets or identification tags for the visitor to fill out in advance. Where tickets or tags are used, print an ample supply. Only about one-quarter of the tickets distributed are likely to be used.

For large affairs, invitations designate a specific time for arrival. Staggering arrival times for different groups helps insure an even, orderly flow of visitors, and eliminates confusion.

3 • PLANT PREPARATION

Housekeeping is usually stepped up in preparation for visitors. Aisle lines are freshened. All safety signs must be bright and clean. Additional lighting is added where necessary.

After the tour route or visiting areas are determined, several careful checks are made by the safety director. All unsafe areas are blocked off and arrangements made for visitors to be given goggles, eye shades, head coverings, or any other special kinds of protection they may need. In addition to eliminating unnecessary hazards, the gesture of providing special safety devices for the visitors helps create a deepened sense of the plant's thoughtfulness.

Before a family day event, arrange for all important machines to be manned by a part of the working force. It may be desirable to have two shifts so that the men at work during one shift can participate in the celebration during the other shift. Since supplies may be cut off because of the hazard involved in bringing them into the plant during the event, see that enough material is on hand to keep production workers busy if the plant is to remain in full operation.

Provision for Refreshments

Provision is made for employees on the job to get hot lunches or suppers. Light refreshments can also be made available to guides in a room set aside for their headquarters. Provide extra facilities and help at all refreshment places to keep litter under control.

The plant's medical and first-aid centers are carefully checked and equipped for all emergencies. If necessary, set up additional first-aid centers along the tour route. Give department heads detailed instructions regarding what to do if a visitor becomes faint or ill, or in case of accident. Mismanagement in an emergency of this sort can undo much of the good achieved by the affair. It is also desirable to take out complete insurance coverage so that the plant is protected against all claims.

Special Information Facilities

Telephone operators are given complete information concerning the affair so that they can readily answer all inquiries. In some instances, it may be desirable to extend the telephone service temporarily. If there is a public address system, check it carefully in advance of the event and arrange to use it to reach visitors with urgent messages. Usually it is a good idea to set aside one room for a headquarters to handle all emergencies.

Decorate entrance ways and less attractive spots along the route. Place a large welcome sign over the main entrance, and perhaps a welcome message from the plant manager. Flags and bunting add to the air of festivity. Put grounds in order, and be sure all lawns and shrubs are trimmed and tidied. Put up tents or other temporary structures if necessary.

Plant police are used on special assignments for the day. Some will probably have to assist in handling traffic. Station others in possible trouble or hazard spots along the route.

4 • THE TOUR

Most visitors attending a family day or open house expect to learn something about how products are made. The tour should certainly satisfy this expectation. But a wisely selected tour route and good use of signs and displays also impresses other important facts on the visitors—for example, that the plant is a good place in which to work, that its profits are fair, or that machines have improved working conditions and lowered costs.

In general, a tour is designed to last not more than two hours at a fairly leisurely pace. Wherever possible, let the route follow a production sequence, from the arrival of raw material to the packaging of the finished product. In larger plants, it may be desirable to have several such tours along different production lines. All of these can be equally publicized, and visitors may choose to see one or more, as they wish. If a tour jumps from one building to another some distance away, it may be desirable to provide simple transportation facilities between the buildings. One method is to mount chairs on aisle trucks and run them frequently between the buildings. If possible, have the tour end near its starting point, or let it feed into areas where there are special displays, motion pictures, music, or the like. Be sure the visitor finds clear direction signs telling him how to get back to his automobile or other transportation facilities.

When a Tour Is Impractical

Some plants do not lend themselves to a sequential tour. In such plants it is often the practice to allow

visitors to roam through the plant as they will. However, a tour in such a plant is possible. Guides can direct visitors to observe such things as impressive machinery and operations that show precision and accuracy in manufacture, quality control, and the diversity of skills needed by employees. Certain behind-the-scene views of the plant can be included. The power house, for example, is almost always spectacular and interesting. Demonstrations and unusual exhibits can be located at different areas to provide definite interest spots or objectives for the visitors.

Safety and comfort of the guests is considered during open house. Locate benches and other rest spots along the route. See that rest rooms are clearly marked, unsafe areas roped off, and messy locations avoided. Some special construction may be necessary, such as stairways or ramps to expedite traffic or scaffolding around large pieces of equipment.

In an event solely for employees, arrange the tour to lead through offices so that friends and families of employees may have a chance to visit with supervisors.

Indicating the Route

Signs and displays are used in abundance. To govern the flow of visitors, route arrows are needed, as well as some special signs to avoid bottlenecks. Use large signs to indicate all safety cautions and to simplify finding rest rooms, refreshment stands, drinking fountains, and first-aid stations.

Signs and displays also do an educational job by helping the visitors understand manufacturing processes. Like a good teacher, they state first what the visitors are going to see, then what they are seeing, and finally what they have seen. For example, a flow chart at the beginning of the tour describes in a general way the entire manufacturing process. Reproduction of the flow chart along the way then shows the visitors what point in the process of production they are witnessing. A display at the end summarizes the entire process.

Signs at entrance ways describe what is done in the aisle ahead. Machines are adequately identified and their functions described in plain language. More complicated machines are accompanied by a model or chart depicting their operation. Along the way, simply worded signs explain materials, processes, and products, as well as the problems they present. If the production line breaks into logical stages, displays at the end of each section, with actual samples or models, summarize what the visitors have so far seen.

Product Information

Of interest to visitors are signs indicating the sources of materials, especially if they come from the immediate area or from many points throughout the world. Likewise, at the end of the tour, signs indicate the destination of products, giving some idea of the economic impact of the plant.

In addition to explaining the processes of manufacture, signs and displays are used to emphasize the fact that the plant is a good place in which to work. They call attention to an especially good lighting installation or to safety precautions, such as special clothing used by employees, protective devices on machines, or caution signals. They indicate comfort facilities for employees, such as smoking stations and drinking fountains. A sign on a suggestion box points out how many suggestions are received each year from employees and how much the company awarded for practical production ideas. If the tour leads past a production process installed on the basis of an employee's suggestion, devise a sign to read something like this:

The process you are witnessing was installed as a result of a suggestion offered by Mr. ————. This process saves the company $—— every day—and the suggestion was worth $—— to Mr. ————.

If the tour leads past medical headquarters, signs can point out pertinent facts about the equipment and services provided free of charge to employees. Signs also tell a good story about special training given to employees, such as the plant's apprentice school.

Recognition of the employee's role in the success of the plant helps sustain the idea that the plant is a good place in which to work. This can be achieved by as simple a device as stating not only the name of the machine being observed but also the name of the operator. A letter received by the superintendent of the slabbing and plate division of the Homestead works of the Carnegie-Illinois Steel Corporation illustrates the sort of dividends that can be expected if employees are properly recognized. This letter was signed by a group of his men, was sent to him shortly after an open house:

We the undersigned, employees of the 160" plate mill, wish to express to you our appreciation for the recognition given to us during the recent "open house." Posting the names of the different operators along the route to acquaint the visitor with the men performing the various duties was a very thoughtful gesture and will not soon be forgotten by the men involved. It made us feel that we were, to say the least, a working part of the plant department organization so ably supervised by you.

Passing on "Economic Information"

Another important function of signs is to stress important economic aspects of management of the plant. The open house is probably the plant's most significant opportunity to give its neighbors factual statements counteracting some of the loose thinking that often leads people to look with disfavor on the private competitive system of enterprise. Signs can point out how much a machine costs; how many shares of stock it represents; the cost of operating a machine, including depreciation; how old the machine is; how much it has meant in the way of wages for its operators and dividends for its owners. For example, Pitney-Bowes, Inc., suspended signs from the ceiling telling the cost of machines in each section. Each of these signs carried the slogan, *"Better tools make better jobs."*

Other signs to educate the public on economic facts can point out how machinery has increased output per man-hour and reduced burdensome tasks and work-hours; how profits and venture capital are essential to plant growth; what economic and social groups are represented among stockholders; how dividends help secure private investment for tools and machines; how the company's sales dollar is divided.

In arranging for signs and displays, it is important to consult all department heads along the tour route lest worthwhile opportunities be overlooked.

CONTINUED ON NEXT PAGE

FACTORY'S Survey of Open House Practices in 47 Companies

GROUPS INVITED TO ATTEND AND METHODS OF INVITATION

a-plant paper, house organ; b-letter; c-bulletin board, plant notices; d-newspapers; e-advertising; f-radio; g-personal; h-telephone; i-formal or printed invitation; ns-not specified

		1 Employees' Families	2 Political, Civic Leaders	3 Heads of Other Plants	4 Union Officials	5 Business Groups	6 Religious Leaders	7 Local Merchants	8 Suppliers	9 Customers	10 General Public	11 When Warranted	12 Yearly	FREQUENCY OF OPEN HOUSE: 13 Full Operation	14 Partial Operation	15 Shut Down	CONDITION OF PLANT DURING OPEN HOUSE: 16 Number of Days	TIME PERIOD FOR OPEN HOUSE: 17 Morning	18 Afternoon	19 Evening	ENTERTAINMENT FOR VISITORS: 20 None	21 Music	22 Talks	23 Product Shows	24 Movies, Slide Films	25 Nursery, Games for Children	26 Booklet, Pamphlet, Etc.	27 Product Sample, Etc.	SOUVENIRS: 28 None	29 Soft Drinks, Milk, Coffee	30 Sandwiches, Co	31 Ice Cre	32
31	**Mullins Mfg. Corp.**	abci										√			√			1		√					√				√	√			
32	Oliver Corp.	i	g	g	i	g	g	g	g	gi	def	√		√				3	√	√			√					√			√	√	√	
33	**Oliver Iron & Steel Corp.**	b			n.s.							√		√				2			√	√						√		√				
34	Pennsylvania Transformer Co.	cd	i	i	i	i	i	i	e	e	e	√		√				1	√	√			√	√				√			√	√	√	
35	**Pittsburgh Plate Glass Co.**	bc	b	b	b	b	b	b	b	b	def	√		√				1-3[13]	√[13]	√[13]	√[15]				√			√	√		√	√	√	
36	Reliance Electric & Engineering Co.	bi	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.[15]	√		√				1	√	√			√					√			√	√		
37	**Republic Steel Corp.**	b[15]	b[13]			b[15]	b[15]	b[15]			def	√		√				1	√	√		√						√			√[15]	√[13]	√[15]	
38	Spicer Mfg. Div. of Dana Corp.	b		n.s.	n.s.	n.s.						√		√				1	√	√	√				√			√			√		√	
39	**Stanley Works**	c	b	b	g	b	b				def[6]	√				√		4			√		√					√			√	√		
40	Stewart-Warner Corp.	ac	b	b	g	b	b		b	b	n.s.	√			√			1	√	√		√						√	√		√	√		
41	**Talon, Inc.**	dg	dg	gh	gh	d	d	d	bg	bgh	dg	√		√				1-2	√	√	√	√						√	√		√		√	
42	Towmotor Corp.	b										n.s.	n.s.	√				1		√		√									√	√	√	
43	**U. S. Steel Corp. (Chicago Dist.)**	bcde	b	b	bg	b	b			bg[13]	def	√		√				1[15]	√	√			√[13]					√	√				√[15]	
44	Weirton Steel Co.	cdf	df	df	df	df	df	df	df	df	df	√		√				4	√	√			√					√		√				
45	**Willys-Overland Motors, Inc.**		b	b	b	b			b		b[36]		√	√				1	√	√	√				√			√						√
46	Worcester Pressed Steel Co.	ai	ai	ai	ai	ai	ai	ai	ai	ai		√		√				1		√	√		√	√				√	√		√	√	√	
47	**Youngstown Sheet & Tube Co. (Youngstown Dist.)**	n.s.									g	√		√				1	√	√		√						√		√				
	SUMMARY											39	7	38	9	5	—	33	43	25	18	18	6	12	3	3	45	19	6	36	28	29	5	
	Inv. by	46	39	37	34	39	35	32	28	30	35																							
	a	13	1	1	3	2	1	2	1	1	1																							
	b	24	27	23	18	26	24	18	18	20	6																							
	c	18	—	—	2	1	—	1	—	—[3]	2																							
	d	9	3	2	3	4	3	5	2	1	20																							
	e	4	1	1	1	1	—	2	1	1	16																							
	f	3	1	1	1	1	1	1	1	1	12																							
	g	1	2	3	4	2	1	2	3	3	3																							
	h	—	1	3	2	1	1	1	1	3	—																							
	i	12	10	8	4	10	8	10	7	9	2																							

SUMMARY OF COLUMNS 1 TO 10: →

First line is number of companies inviting each of the ten groups; subsequent lines show total number of companies using particular method for inviting particular group. For key, see heading of columns at top of page. Frequency of combinations is not indicated in summary

2. Visitors move over route continuously, not in groups
3. One committee in each plant handles all details
6. Separate invitations to students and teachers
8. Some areas closed to students and visitors
11. Two plants
15. Varies with plants and occasion
33. Safety and first aid
34. Boy Scouts, civic leaders, women's clubs
35. Finance
36. Editors and publishers, educators, financial and banking executives only
37. Administrative personnel
38. Staff of administrative personnel perform all functions; not formally organized as a committee
39. Subcommittee
40. Subcommittee on registration

| | SOUVENIRS | REFRESHMENTS | | | | HOW VISITORS MOVE THROUGH PLANT | | | | | | | | | BADGES OR TAGS PROVIDED | | HOW ECONOMIC INFORMATION IS PASSED ON TO VISITORS | | RETAIN CONSULTANT | OPEN HOUSE COMMITTEES AND MEMBERSHIP COMPOSITION
m-management; w-wage earners; u-union officials; c-consultant; ns-not specified | | | | | | | | |

FACTORY'S Survey of Open House Practices in 47 Companies

GROUPS INVITED TO ATTEND AND METHODS OF INVITATION

a-plant paper, house organ; b-letter; c-bulletin board, plant notices; d-newspapers; e-advertising; f-radio; g-personal; h-telephone; i-formal or printed invitation; ns-not specified

		Employees' Families	Political, Civic Leaders	Heads of Other Plants	Union Officials	Business Groups	Religious Leaders	Local Merchants	Suppliers	Customers	General Public	When Warranted	Yearly	**FREQUENCY OF OPEN HOUSE** Full Operation	Partial Operation	Shut Down	**CONDITION OF PLANT DURING OPEN HOUSE** Number of Days	**TIME PERIOD FOR OPEN HOUSE** Morning	Afternoon	Evening	**ENTERTAINMENT FOR VISITORS** None	Music	Talks	Product Shows	Movies, Slide Films	Nursery, Games for Children	Booklet, Pamphlet, Etc.	**SOUVENIRS** Product Sample, Etc.	None	Soft Drinks, Milk, Coffee	Sandwiches, Cookie	Ice Cream	F
		1	2	3	4	5	*6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	Allegheny Ludlum Steel Corp.	acde	b	b	acde	abcde	b	acde	— [1]	— [1]	acde	n.s.	n.s.	√			2	√	√	√		√					√			√	√	√	
2	**American Central Div., Avco Mfg. Corp.**	**b**	**b**	**b**	**b**	**b**	**b**	**b**			**d**	√		√			1	√	√				√				√			√		√	
3	American Steel & Wire Co.	ad	b	b	— [4]	b	b	bdg	bdg	b	d	√		√			1	√	√		√						√	√	√				
4	**American Welding & Mfg. Co.**	**abi**	**bg**	**b**	**b**	**i**	**i**	**i**	**b**	**b**	**defi** [6]	√		√			1	√	√			√					√			√	√	√	
5	Armco Steel Corp.	ac	bd	bd	bd	bd	bd	bd	b	b	bd	√		√			3		√	√	√						√	√	√ [4]				
6	**Benjamin Electric Mfg. Co.**	**ci**	**bi**	**bi**		**bi**	**bi**	**bi**		**bi**			√	√	√ [9]		2		√	√		√					√			√	√		
7	Bigelow-Sanford Carpet Co.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.			n.s.	√		√			2	√ [10]	√	√ [10]	√						√			√	√	√	
8	**Carboloy Co., Inc.**	**b**	**b**			**b**						√			√		1			√	√						√			√		√	
9	Carnegie-Illinois Steel Corp. (Homestead Dist.)	cdf	i	i	i	i	i	i	i	i	df [6]	√		√			3	√	√	√ [15]		√					√	√		√		√	
10	**Carrier Corp.**	**b**	**b**	**5**	**b**	**b**	**b**	**b**	**b**	**b**	**df**	√			√		1	√	√	√			√				√			√	√	√	
11	Caterpillar Tractor Co.	abdf	bh	bh	bh	bh	bh	bh	bh	bh	bdfg	√		√			— [15]	√	√	√ [15]				√	√		√						√ [16]
12	**Cleveland Graphite Bronze Co.**	**acd**	— [17]	— [17]	— [17]	— [17]	— [17]	— [17]	— [17]	— [17]	— [17]	√		√			1		√	√	√						√			√	√	√	
13	Continental Steel Corp.	b	b	i	b	b	b	b	b	b	def	√		√			1	√	√	√		√		√			√	√		√	√		
14	**Dobeckmun Co.**	**b**			**b**							√				√	1		√			√						√		√	√	√	
15	Dodge Mfg. Corp.	ab	b	b	n.s.	b	b	b	b	b	b	√		√			3	√	√	√	√						√			√	√	√	
16	**Electric Products Co.**	**ac**			**ac**					**bh**		√			√		1			√		√	√	√			√	√		√		√	
17	Emerson Electric Mfg. Co.	bi	bi	bi	bi	bi		bi	bi	bi		√				√	1	√	√			√					√		√				
18	**Ford Motor Co.**	**b**	**b**	**b**	**b**	**b**	**b**	**b**	**i**	**i**	**de**	√		√			1-2	√	√		√						√			√		√	
19	General Mills, Inc.	bc	b	b	b	b	b	b	b	b	b	√		√ [15]	√ [15]	√ [15]	— [15]		√				√				√	√			√		
20	**General Motors Corp.**	**abc**	**b**	**b**	**b**	**b**	**b**	**b**	**b**	**b**	**e**	√		√			2 [13]	√	√	√	√						√			√	√	√	
21	Great Lakes Steel Corp.	c	bi	i	b	bi	bi	i	i	i	de	√		√			2	√	√							√	√			√			
22	**Hamilton Foundry & Machine Co.**	**bi**	**i**	**i**		**i**	**i**	**i**	**i**	**i**	**cd**		√ [25]		√		2		√		√						√	√		√	√	√	
23	Hotpoint, Inc.	abc	b	gh	— [26]	bg	b	b	b	b	def	√		√			3		√	√		√		√			√			√	√	√	
24	**International Harvester Co.**	**bei**	**bi**	**b**	**b**	**bi**	**bi**	**bei**	**bi**	**bi**	**be**	√ [15]	√ [15]	√ [13]	√ [13]	√ [15]		√	√					√		√	√	√		√	√	√	√ [16]
25	Johnson & Johnson	b	b	b	b	b	b	b	b	b	def	√		√			18	√	√	√	√						√	√		√ [16]	√ [16]		√ [16]
26	**Lever Bros. Co.**	**i**	**i**	**n.s.**	**n.s.**	**n.s.**	**n.s.**	**n.s.**	**n.s.**	**n.s.**		√		√			1	√	√	√		√		√	√	√	√	√		√	√	√	
27	Lukens Steel Co.	be	be	be		b	b	b			e		√	√			1	√	√		√						√			√	√		
28	**Lynchburg Foundry Co**	**bci**	**n.s.**	**b**			**bi**				i [29]		√	√			5	√	√		√						√			√		√	√ [16]
29	Minnesota Mining & Mfg. Co.	i	i			i		i			e	√		√			2	√	√	√		√		√			√	√		√	√	√	
30	**Monsanto Chemical Co.**	**b**	**b**	**o** [15]	**b**	**b**	**b**		**b**	**b**	**b**		√ [15]	√			1	√	√	√				√	√		√	√		√	√	√	

1. Invited to participate with exhibits
2. Visitors move over route continuously, not in groups
3. One committee in each plant handles all details
4. General public
5. Publications, safety
6. Separate invitations to students and teachers
7. No fixed number
8. Some areas closed to visitors
9. Evening
10. One of two days
11. Two plants
12. Special visitors only
13. Evening one day only; for supervisors and families
14. Itinerary, safety and welfare, ways and means
15. Varies with plant and occasion
16. For certain groups
17. No special i
18. Refreshment
19. No committe
20. Employees a

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	UVENIRS		REFRESHMENTS			HOW VISITORS MOVE THROUGH PLANT								BADGES OR TAGS PROVIDED		HOW ECONOMIC INFORMATION IS PASSED ON TO VISITORS			RETAIN CONSULTANT												OPEN HOUSE COMMITTEES AND MEMBERSHIP COMPOSITION m-management; w-wage earners; u-union officials; c-consultant; ns-not specified			
	Coffee																														Number of Visitors Attending Last Open House	Cost Per Visitor of Last Open House	
	ies, Cookies, Etc.	Ice Cream	Full Meal	At Will	On Escorted Tours	Supervisors Are Guides	Wage Earners Are Guides	Stewards' Are Guides	Guides Give Prepared Talk	Guides Answer Questions	Route Receiving-to-Shipping	Other Route	Average Number of Visitors in Group	For Committee and Guides	For Visitors	No Attempt Made	Booklets, Pamphlets, Etc.	Special Displays, Programs, Etc.	Yes	No	Steering	Promotion	Invitations	Plant Preparation	Tours and Guides	Displays	Traffic	Hospitality	Properties	Information	Refreshments	Employee Instruction	Other			
	32		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
			√		√	√	√		√	√		— [2]	√			√	√		√												m [3]	37,377	Under $1.00	1
				√	√	√	√	√		√		20-25	√			√	√		√		mw	mw	mw	mw	mw	mw	mw	mwu	mw	mwu	mw	mw		4,000	No est.	2
			√		√	√	√		√	√			√				√		√	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu					mwu [5]	12,500	2.00	3
			√	√	√	√	√	√	√		√	— [7]	√	√		√	√	√		muc	mc	muc	mwuc	mwu	mc	mwu	mwu		mc	mw	mwu		7,400	.75	4
			√ [8]		√	√	√		√	√		— [2]	√			√	√		√	mu	mu	m	m	mu	mu	mu	mu	mu	mu	mu	mu		23,000	No est.	5
				√	√	√	√	√		√		10-15	√		√				√	m	m	m	mw	mwu	mw	mwu			mw	m			2,400	No est.	6
				√	√	√	√	√		√		50-75	√	√		√	√	√					mwu	mwu	mw		mw		mw	mwu	mwu		28,000 [11]	.30	7
			√ [8]	√	√				√	√		15-20		√ [12]	√				√													m [3]	2,500	.62	8
				√	√			√	√	√		— [2]	√			√	√		√	m	m	m	m	m	m	m	m	m	m	m	m [14]	56,008	No est.	9
			√	√	√	√	√	√	√		√	— [7]	√		√				√	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu			20,000	No est.	10
	√ [16]			√				√			√	10 max.	√	√			√		√	m	m	m	mw	mw	m	m	mw	mw	m	m	m		no est.	No est.	11
				√	√			√			√	25	√				√		√	m	m	m	mwu	m	mw		mwu		mwu	mw	m		5,000	.35 [18]	12
			√ [8]	√	√	√			√	√		— [2]	√			√	√		√	mw	mw	m	mw	mw	m	mw	mw	m	mw	m	m		10,000	No est.	13
			√		√	√	√		√		√		√		√				√													— [19]	1,000	.50	14
			√ [8]				√				√		√	√			√		√	mw		mw	mw	mw			mw			mw			3,100	1.50	15
			√ [20]												√																	w [21]	800	.10	16
				√	√	√	√		√	√		— [2]	√	√	√				√	m	mu	mu	m	mu	m	m	mu	m	mu					6,000	No est.	17
			√	√		√		√	√	√			√				√		√													— [19]	10,000 [22]	No est.	18
				√	√	√	√	√	√	√		20	√		√				√		mwu		mwu	mwu	mwu				mwu	mwu	mwu			19,000 [11]	.03	19
			√	√	√				√	√		15	√			√	√		√													— [19]	255,900 [23]	No est.	20
			√		√				√	√		10-12	√	√		√	√		√				m									m [24]	20,000	2.00-2.50	21
				√	√	√		√			√	— [2]	√	√	√				√													m [3]	6,000	No est.	22
			√	√	√			√	√	√		25	√				√		√	m	m		m	m	m	m	m		m				22,800	.75	23
	√ [14]		√	√	√	√		√	√	√	√	10-50	√	√ [15]		√	√	√ [15]		m	m	m	mw	mwc	m	mw	m	mw	mc	mw	m	m [27]	3,000 [28]	No est.	24
	√ [16]			√	√		√	√			√	15-20	√	√		√	√	√		m	muc	mu	mwuc	mwuc	mwc	mwu	mwu	mwu	mwu	m	m		15,800	3.00	25
			√	√	√	√	√	√		√			√				√		√	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu	mwu		8,000 [28]	No est.	26
				√	√				√	√		30	√		√				√	mw	mw	m	mw	mw	mw	mw	mw	mw	mw	m			1,250	No est.	27
	√ [16]			√	√ [30]			√	√		√	10-15	√	√		√	√		√													m [3]	1,900 [28]	No est.	28
				√	√	√		√	√	√			√	√	√				√	mw	mw			mw	mw	mw				mw		mw [31]	5,025	.22	29
			√ [8]	√	√	√	√	√		√			√			√	√		√	mwu		n.s.	n.s.	n.s.	n.s.	n.s.				mwu			5,000	1.00 [32]	30

21. Employees' social committee handles arrangements
22. Ypsilanti plant only
23. Total, all General Motors plants for 1947
24. Arrangements
25. Regularly; period not specified
26. No union
27. Nursery
28. One plant
29. Seniors and faculty of local schools and colleges only
30. Office and sales people
31. Registration
32. Includes $.35 for gift souvenir

pecial invitations issued; admission by request
shments only; other costs not estimated
ommittees established
oyees act as their own guides for informal groups

5 • SPECIAL DISPLAYS AND FEATURES

Special displays and features are a second means of communicating ideas to visitors and can be used in addition to signs and displays along the route. Some are located in areas through which the guests are routed; others are placed in the auditorium, the yards, display room, or by entrances and exits.

Employee welfare is a popular subject for displays. One may be on safety, showing special clothing, accident records, first-aid equipment, and the like. Another can be built around retirement and pension plans, or health and hospital plans for employees.

If the plant uses the suggestion system, a display points out the number of employees who have been given awards for suggestions and the dollar values of the awards. To emphasize that many employees feel the company is a good place to work, a display is constructed on a theme of long service and low turnover on merit recognition. A display of employees' hobbies always attracts broad participation among employees and is usually of outstanding interest to visitors. To increase participation in such an exhibit, a hobbies committee is formed in each section, and shipping facilities are made available to employees with bulky materials to display.

Interesting displays can be developed to show where the company gets its materials and ships its products. If the factory produces consumer products, cooperation of dealers is enlisted in setting up displays of products and point-of-sale advertising. If the factory produces materials or parts used by other factories, customers are called upon to assist in arranging displays to show the final products in which the factory output is used. If the plant is one of many divisions of the company, the products of other divisions make an informative display.

To illustrate progress, an historical display shows how products have been improved since they were first manufactured, how the cost has gone down and the quality up. Another display can show how products are merchandised.

To emphasize the importance of machinery, a display is built around the subject of output per man-hour—how machines have enabled men to produce more goods in fewer hours. To correct misconceptions about profits and wages, a display is built around the subject of what happens to a dollar from sales, illustrating how much goes into wages, raw materials, advertising and distribution, replacements, surplus, taxes, dividends, and taxes on dividends.

Another timely economic message is presented in

This line of
7 NEW PRESSES
COST +137,000.00
IT IS PART OF MULLINS PLAN TO MAKE THIS A COMPLETELY MODERN FACTORY SO THAT OUR EMPLOYEES WILL HAVE THE EQUIPMENT NECESSARY TO HELP THEM MEET THE COMPETITION OF OTHER MANUFACTURERS AND PROTECT THEIR JOBS FOR THE FUTURE!
IT IS ESTIMATED THAT THE TOTAL COST OF THE MULLINS PLAN TO PROVIDE EMPLOYEES WITH NEW TOOLS, BUILDINGS, & EQUIPMENT IN THE NEXT FEW YEARS WILL BE MORE THAN SEVEN MILLION DOLLARS

COST OF MACHINES is frequently stressed in booklets and in placards like this one at Mullins

6 • GUIDES

Use of guides is the third method of communicating ideas to the visitors. Guides may be of two sorts—stationary guides located along the route and mobile guides who conduct small groups through the plant. It is possible for both types of guides to be used at the same event. As a rule, where large crowds are expected, stationary guides are a must, because it is virtually impossible to organize visitors into small groups for formal tours. Some plants use the museum technique of having mobile guides conduct tours for visitors who want them, allowing the more casual visitors to go their own way finding things out for themselves by reading the signs, studying displays, and making inquiries of stationary guides posted along route.

Let employees accompany their families and friends and serve as guides for their own groups. Arrange to provide these employees with the same sort of detailed information on the tour route that is given to regular guides. Other mobile and stationary guides are drawn on a quota basis from various sections. Some of the qualifications that should be sought in their selection are a good speaking voice, attractive appearance and personality, and familiarity with the plant.

As a rule it is desirable for all guides to be provided with a distinguishing ribbon, button, hat, armband, or costume.

Meetings are conducted for guides before the event. Arrange for mobile guides to cover the route of their tour several times, practicing and coordinating their descriptive talks. Generally the talk is confined solely to manufacturing processes. It includes such items as the history of a process of production, training requirements of people making the products, safety and precision of machine operations, cost and output

NEED FOR PROFITS as a source of new capital to provide more output, more jobs, and better working conditions can be emphasized, as at Pittsburgh Plate Glass, by relating message to actual improvements

a display showing the importance of the customer as the final arbiter on the company's products and, consequently, its prosperity, by accepting or rejecting its products when they reach store shelves.

How the plant serves the community is a possible subject for display. It shows how plant expenditures for materials and payroll have contributed to community growth, how the plant has helped to build prestige for the community, and how it participates in civic affairs.

Displays are supplemented by literature tables, company-produced motion pictures, and demonstrations. Often regular sales demonstrations make interesting shows for an open house.

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of machinery, materials used in production, distribution and use of products, and historical aspects of the plant and its operations. Take care to keep all talks to a level that anybody can understand. It is a safe assumption that few visitors understand the technical terminology and local jargon in everyday use at the plant.

A good impression is made by guides if they exhibit a friendly, easy attitude with the workers, but this should not be carried to the point of seeming to be patronizing. A guide may ask an operator to describe something to the group. In introducing the operator to the group, he refers to him not as "Johnnie" but as "Mr. Jones," or "John Jones."

Guides warn their group before they enter an especially noisy location and advise them to postpone their questions until after leaving it. Questions are handled with dispatch, and guides are careful not to let one or two visitors monopolize the conversation. Special inquiries which are difficult or impossible to answer on the tour are written down and answered by correspondence after the event.

Interest will fall off rapidly if the guide is not heard by all his group. He must talk loudly, using a microphone or portable amplifier if necessary.

Stationary guides have a different function to perform. They are more like behind-the-counter sales people, ready to help any of the spectators whose curiosity seems to be on the verge of breaking out into questions. Their conversations with spectators are longer and less formal than the conversations engaged in by mobile guides. Stationary guides also keep an eye open for hazardous situations and move people along through bottleneck areas.

Be sure all guides are well equipped with information regarding displays and special events taking place during the open house so that they can answer inquiries.

CONTINUED ON NEXT PAGE

7 • TRAFFIC

Special parking facilities are required if the visiting group is large. Usually the local police grant special parking privileges along the streets near the plant and assign additional men to spots where traffic is heavy. Plant police should also be on the scene, guiding cars swiftly to convenient parking spots. Since they represent the company, which is the host at the occasion, they are instructed to extend every possible courtesy to the visitors. Gruff treatment to motorists seriously detracts from visitors' pleasurable memories of the occasion.

Signs help the motorist find his way to the parking spot. If the parking area is large, or if several parking areas are used, it is well to mark specific locations with a large letter or number so that drivers can find their way back to their cars conveniently. If parking areas are located at some distance from the plant, arrange for convenient transportation from

8 • HOSPITALITY

Everything possible should be done to make the visitors feel at ease and at home during their visit to the plant. They should be welcomed at the gate, perhaps by plant executives or by attractive women employees. See that registration, if any, is simple and expeditious. At some open houses, corsages have been given to women visitors and little mementos, like balloons or buttons, to children. Sometimes the welcoming committee provides visitors with a brochure containing a welcome message, a description of what they are going to see (perhaps including a tour map), and a schedule of all special events and demonstrations. In some plants this is expanded into a full-size souvenir booklet.

Although refreshments are not essential, they are certainly a gesture of hospitality. Sometimes there is a pattern among plants in the community as to how extensive refreshments should be. In some plants a

9 • SPECIAL ARRANGEMENTS

Music adds considerably to the occasion. A bandstand can be erected in the central yard, and music provided by an employees' musical organization or local high schools. Use the public address system for broadcasting recordings as well as for paging visitors within the plant.

HOTPOINT MAKES IT EASY FOR PARENTS TO ATTEND OPEN HOUSE WITH SURE KNOWLEDGE TOTS ARE IN GOOD HANDS

those lots to the plant entrance. If possible, avoid selecting parking lots that might be muddy in case of rain.

To aid motorists in reaching the plant, place directions at intersections and along the highways approaching the plant. To avoid congestion near the plant, railroad street crossings should preferably be out of service for the duration of the event, and all trains and trucks that normally move in and out of the yards should be stopped.

Special streetcars, buses, passenger trains, and perhaps taxis are mobilized to assist in transportation. Public transportation systems set up special schedules and add vehicles. Either the plant or the transportation companies themselves prepare signs identifying public vehicles as being en route to the plant. Information on all traffic arrangements is passed along to the man who is handling promotion for the event and from him, in turn, to the newspapers and radio stations.

refreshment stand is located at the end of the tour route where sandwiches and soft drinks can be either purchased or obtained free. Refreshment stands along the route are sometimes an inconvenience, since they tend to create bottlenecks. Sometimes the plant cafeteria is made available to visitors. On some occasions outside charitable agencies have set up refreshment stands.

Women employees are customarily on duty at first aid stations and in the rest rooms, and should be easily identifiable. Sometimes special corsages are provided for women helping with hospitality.

Set up an information desk at the main entrance for all inquiries regarding comfort and first aid facilities, special events, and lost and found articles. Provide messengers near the information desk for conducting visitors to special destinations.

Consider added facilities that might be needed in case of rain, such as a system for checking wraps, umbrellas, and rubbers.

Since many families will not undertake a visit to the plant because of the burden of caring for their children, it is a good plan to set up a nursery with trained personnel in charge and perhaps some entertainment.

Special arrangements also include novelties, such as candid photographs or an open house edition of the plant news with made-to-order headlines for the visitors. While such devices may be relatively expensive, they tend to fix the event permanently in mind.

CONTINUED ON NEXT PAGE

ENTERTAINMENT, PROFESSIONAL CARE IN NURSERY SOLVE THE PROBLEM OF WHAT TO DO ABOUT THE YOUNGSTERS

10 • SOUVENIRS

Some souvenir should be given to visitors. It may be a book containing such items as a welcome message, a description of the company, details on any special occasion being celebrated, financial and historical facts about the company, pictures of key plant personnel and typical operations, a review of employee welfare programs and management policies, facts about the company's scope of operations and its importance in the community and the nation, facts about production and distribution of the company's products, and the company's plans for the future. Plan the souvenir book well in advance in order to obtain favorable printing dates and good paper stock. In some cases, it is a special edition of the plant paper or magazine.

If the company's product is not too expensive, a sample of it serves as an attractive souvenir. It can be made more memorable if it is given to visitors right off the production line after they have witnessed all the operations that go into the making of a typical production unit.

Company literature often provides good take-away material for the visitors as they leave the plant, particularly any brochures developed for employees on employee programs or for the general public on the company's operations.

11 • PROPERTIES

Since many different committees will be arranging for signs, displays, buttons, badges, arm bands, and the like, it is desirable to have one central clearing house for all properties of this sort. The clearing house may be a regular operating division of the plant or an outside agency. The advantage of having a single clearing house is to secure uniformity in color and style throughout all special properties. One way to reduce confusion in the production of signs is to issue, very early in the planning stages, a set of specifications for various kinds of signs so that each committee requiring signs knows the physical resources at its command, as well as where to turn for advice and counsel.

12 • INFORMATION

Since the family day or open house is primarily a medium of communicating information to residents of the plant community, a tremendous amount of information must be made available to planning committees. This information comes from publicity files, foremen and supervisors, purchasing department, accounting department, plant library, and other employee sources. Secure as much information as possible from all quarters. Begin the search for pertinent data by distributing to information sources a sheet listing the areas in which information is being sought. If an information center is established, provide for swift forwarding of useful ideas to committees.

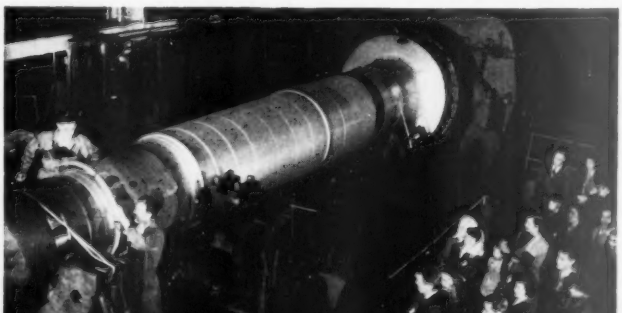
13 • FOLLOW-UP

To round out the occasion, a follow-up is desirable with the employees and with certain visitors. Send letters of appreciation to certain prominent visitors expressing thanks for their having taken the time to attend the open house. It is also a good idea to send albums containing pictures and other documents from the open house ceremony. Many visitors may have asked for special bits of information during their visits. If a record was kept of these requests, get the information and wire a friendly letter to the inquirer. If the plant intends to follow the open house with a series of special tours for civic and educational groups, the guest list will provide a number of names of people with whom such tours might be initiated.

A letter of thanks should be sent by the plant manager to all employees who helped directly on committees, and to all other employees for their cooperation. This letter also summarizes the major facts about the open house, such as attendance, some of the prominent people who attended, and some of the comments received.

So that employees may continue to enjoy the full flavor of the event after it is over, a display of pictures, letters and comments, and other records of the occasion can be set up at the main gate.

SAFETY DISPLAYS AND SPECTACULAR OPERATIONS ARE ALWAYS AMONG MOST POPULAR FEATURES AT ANY OPEN HOUSE



How to Use Mercury Arc Rectifiers

Mercury arc rectifiers offer important advantages to industry when conversion of electrical energy from alternating to direct current becomes necessary

O. KELLER • APPLICATION ENGINEER, RECTIFIER DEPARTMENT, ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

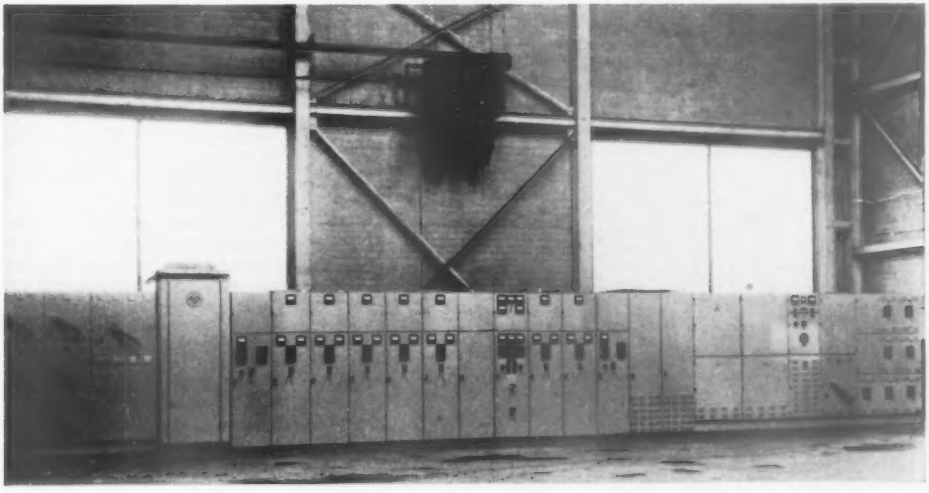
THE MERCURY ARC RECTIFIER is well established as a converter of a.c. to d.c. in industrial plants, as well as in other fields. It provides inertia-less power conversion with simple lightweight equipment requiring little upkeep.

The basic theory of electronic rectification is simple. That is, in a vacuum electrons can be made to move in one direction between certain dissimilar substances—from mercury to carbon, for instance—but not in the opposite direction. Consequently, if a cathode consisting of a small pool of mercury is enclosed in an evacuated vessel with a graphite anode, an electron-carrying arc can easily be established from the mercury to the graphite. This arc will act as a check valve to the passage of electrons in the opposite direction.

If two such half-wave rectifier tubes are connected respectively to the two ends of the secondary winding of a single-phase transformer, a full-wave rectifier is obtained. If three or more such tubes (usually six) are connected to the secondaries of a three-phase or a three-phase/six-phase transformer, a multi-phase rectifier is obtained that has a smoothness of output which is sufficient for all practical purposes.

In general practice two sets of three-phase secondary windings, displaced 120 electrical degrees with respect to each other, are connected through a center-tapped reactor called an interphase transformer. This further increases the efficiency and copper utilization of the transformer and reduces the stresses on the winding.

Considering the over-all installation, a mercury arc rectifier operating above 200 volts d.c. is more efficient than either a rotary converter or a motor-generator set, particularly at partial loads. For applications that require the equipment to stay idle for any length of time, the rectifier with its very low no-load losses becomes economically most attractive. Furthermore, operating records consistently show a lower maintenance expense than that of similarly rated rotating conversion equipment.



COMBINATION of a.c. and d.c. distribution systems in a compact installation is made possible by standardization of the load center substation rectifier unit employing sealed rectifier tubes. The photograph directly above shows an installation of a stepdown transformer, high-voltage switchgear, motor control compartments, and a complete 500-kw., 250-volt d.c. rectifier unit, installed in a steel plant.

The transformers are the air-cooled, dry type, exemplifying the trend to that type of construction for installations where liquid-filled equipment (either oil or non-flammable liquid) is not desired.

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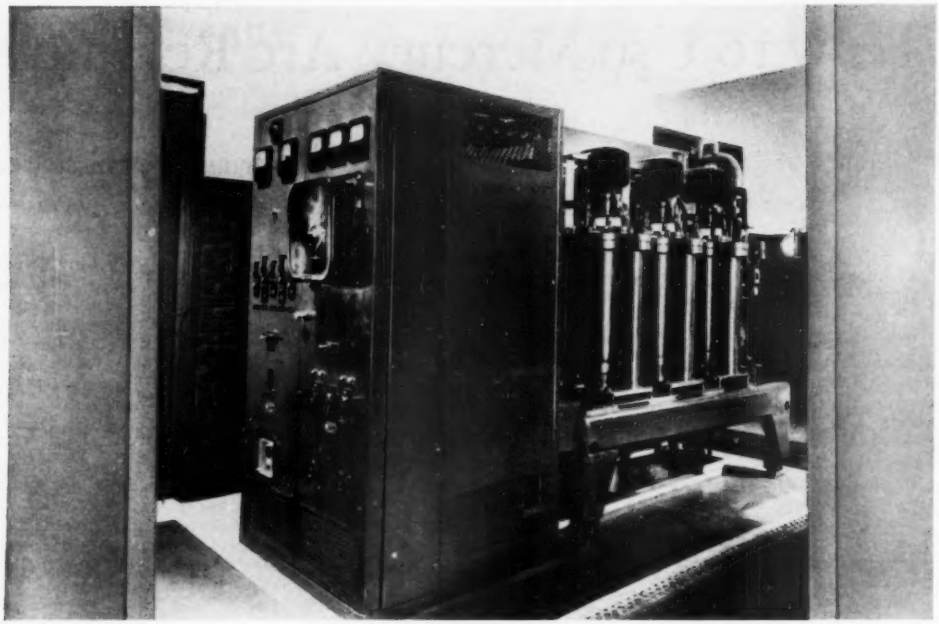


PUMPED-TYPE RECTIFIERS, single-anode, individual, heavy-duty tank units, have virtually eliminated the multi-anode tank rectifiers that were widely used in railroad electrification and in the electrochemical industry after their introduction into the U.S. in the 1920's. Because multiple-anode rectifier construction requires greater spacing between elements, voltage drop across the arc is greater and efficiency is reduced. However, on higher voltage applications multiple-anode units still offer some advantages.

The larger, more familiar pumped-type rectifiers are used where larger amounts of power are required than can conveniently be furnished by the permanently sealed-tube type. The photograph above shows an installation in an eastern newspaper printing plant.

At present, a commonly used dividing line between the pumped and the sealed rectifiers is a rating of 500 kw. at 250 volts. Above that the pumped units are used, as they have a higher current rating per tank than the sealed type.

HOT-CATHODE tube-type rectifiers are advantageous for use in installations requiring still smaller amounts of power and for light-duty service, say from 1 to 15 kw. at 125 or 250 volts. These rectifiers, which are available for 220- or 440-volt single-phase or three-phase supply, employ glass envelope tubes, and are completely self-contained units. A typical unit is shown at the left.

Such small rectifiers are well adapted for individual drives on lathes, grinding or milling machines, for testing purposes, and in toolrooms where small amounts of d.c. power are required. They are frequently used for supplying magnetic chucks and clutches, as well as separating and lifting magnets. Since they are self-contained sources of steady d.c. power, they are suitable for constant-voltage applications, and no grid control ordinarily is furnished with them. They can, of course, be used with any conventional external type of voltage regulating device, such as a rheostat or a continuously adjustable regulating transformer, if the requirements of the application make it necessary.

PERMANENTLY EVACUATED, sealed-tube rectifiers, mentioned previously, are available in factory-assembled, load-center substation form in ratings up to several hundred kilowatts. These rectifiers, which are of a lighter-duty type, embody the same principles as the continuously evacuated pumped-type tanks.

Sealed tubes have the advantages of requiring no vacuum pumping or vacuum measuring equipment, and of being lighter in weight than the pumped tanks. Six or twelve tubes can be mounted in a lightweight single or double compartment in a unit substation so as to facilitate the replacement of tubes easily and quickly. The photograph shows such an installation with the door of the rectifier compartment open. Throat connections eliminate bushings or exposed busbars. The metal-clad a.c. switchgear provides the interrupting capacity necessitated by the a.c. supply system. The d.c. switchgear includes a cathode circuit breaker with reverse current protection, and usually such feeder breakers as may be called for by local conditions.

The necessary ignition equipment, as well as the grid control auxiliaries, are located adjacent to the d.c. switchgear. It is usually in the upper part of the main cathode breaker compartment, for installations rated 300 kw. or less, or in a separate compartment in installations rated 400 or 500 kw.

CHANGEOVERS from locally generated d.c. power to purchased a.c. power often make use of both pumped and permanently sealed rectifiers. In a midwestern industrial plant, for example, a sealed-tube rectifier took the place of two old engine-driven generators.

Both sealed-tube rectifiers and the larger pumped units are cooled by water, usually through the medium of a water-to-water heat exchanger. This heat exchanger unit, together with all necessary temperature control devices, is located in the rectifier tube compartment, back of the sealed tubes. Where it is not feasible to use this type of cooling, a more expensive water-to-air heat exchanger can be used.

Since the electrons in a rectifier can travel only from the mercury cathode to the graphite anodes, and not in the reverse direction, a rectifier cannot absorb any power that may be regenerated during dynamic braking of d.c. motors supplied by it. It often happens, of course, that other current-consuming devices also are connected to the rectifier, and these can effectively absorb the power that may be regenerated.

To take care of the situation where there is a possibility of no load being connected to the rectifier other than the motor or motors that may be regenerating, load-absorbing resistors are used that are automatically cut in when needed.

With a 125/250-volt, three-wire system, if the amount of unbalance between the two separate 125-volt systems is not greater than 15 per cent, a small balancer set can economically be used to take care of the unbalance. Larger amounts of unbalance, however, up to 100 per cent, require two 125-volt full-current-capacity rectifiers in series

DECENTRALIZATION, the present trend in d.c. power supply for industrial applications, is an extension of the principle first adopted when long lineshafts were replaced by individual motor drives. Splitting up the equipment that supplies d.c. power results in better voltage regulation and, generally speaking, higher voltage at the point of use. Also, it saves an appreciable amount of copper because the power can be distributed over the a.c. lines at 2300 or 4160 volts, instead of d.c. at 250 volts.

The simplicity of the equipment, particularly the ease of replacing tubes and doing such minor maintenance work as occasional inspection, makes it possible for the same number of attendants to take care of a number of unit load-center substations as would be required to take care of one large m.g. set or synchronous converter.

Key Men in 1949 Legislation

All photographs Wide World

← ALBEN W. BARKLEY
Vice President of the U.S. and President of the Senate. He is a Truman lieutenant on the Hill. He will carry more influence than any vice president in modern times and is for Truman's program 100 per cent.

SAM RAYBURN →
Speaker of the House. Not active at working level where legislation is drafted, but, more than anyone else, he's the boss of the House who determines when and what kind of bills come up for debate and vote. He's a Truman man, can be counted on to push Truman's program.

← SCOTT LUCAS
Senate Majority Leader. He's a Roosevelt New Dealer. He changed his mind on Taft-Hartley, voting for the bill and later switching to uphold Truman's veto. His influence will come chiefly from leadership of the 14 new Democratic Senators.

JOHN McCORMACK →
House Majority Leader. A dyed-in-the-wool New Dealer who will be out after votes for the secondary portions of Truman's program, such as civil rights, compulsory medical insurance; will favor Lesinski's new labor bill, 75-cent minimum wage, more corporate taxes to balance the budget, priorities and allocations of scarce materials.

← ROBERT A. TAFT
Senator Minority Leader. Still the most influential Republican in Congress. On domestic issues, considerably more liberal than is generally recognized. Favors public housing, higher minimum wage, Federal aid to education, admits some defects in Taft-Hartley. Would increase taxes rather than go into the red.

JOSEPH W. MARTIN →
House Minority Leader. His job is to keep as many Republicans in line as he can to build a GOP record in substitution for Truman's program. Will oppose the new labor law, favor increasing minimum wages but not to 75 cents right away, will work to cut government spending.

Affecting Industry

← **ELBERT THOMAS**

Chairman, Senate Labor Committee, His chairmanship makes him perhaps the most important member of that body on such issues as Taft-Hartley revision and Social Security expansion. He's a New Dealer on such matters.

JOHN LESINSKI →

Chairman, House Labor Committee. His group will write the new labor law along the lines Truman wants. The CIO's best friend among House leaders. And outside labor, too, he will be for Truman's program.

← **WALTER GEORGE**

Chairman, Senate Finance Committee. He stands with Doughton on taxes, a little more liberal, though, on Social Security and the like. Also insists on a balanced budget. His influence will be used to moderate Truman's program.

ROBERT DOUGHTON →

Chairman, House Ways and Means Committee. More than any other one person, he will determine what kind of tax bill goes through the House. He is inclined to go easy on corporate tax increase, but tough on keeping the budget balanced. Will have a lot to do with shaping new Social Security legislation, and here again leans conservative.

← **JOSEPH O'MAHONEY**

Chairman, Joint Economic Committee. A Truman man replacing Taft on the committee, the Senator is for raising corporate taxes, having government channel scarce materials; No. 1 man on anti-monopoly and regulation of business expansion. Only place he isn't a New Dealer is on reciprocal trade, where he votes to protect Wyoming wool.

BRENT SPENCE →

Chairman, House Banking Committee. This committee will write the materials controls laws, as well as housing, loans to business. Another Truman man, he's for the president on those issues, will generally support Truman's whole program.

CONTINUED ON NEXT PAGE

Key Men in 1949 Legislation

←**HENRY CABOT LODGE, Jr.**
Senator from Mass. Leader of the newer Republicans in the Senate. His differences with Taft are more tactics and political appearances than they are real. Wants new leadership more than new policy because he thinks Taft is associated in the public mind with reaction.

CLARENCE BROWN →
Representative from Ohio. He is Taft's man in the House, a member of the powerful Rules Committee which acts as traffic cop for what legislation comes to the floor.

← **J. HOWARD McGRATH**
Senator from Rhode Island and Democratic National Chairman. A New Dealer, but a politico of whom Southern Democrats say, "He is a fellow who understands how the other fellow feels."

HOWARD W. SMITH →
Representative from Virginia. The real leader of the Democratic conservatives in the House. Author of the "force and violence" prohibitions in the Smith-Connally and Taft-Hartley laws, he is a natural leader of any Southern Democrat-Republican coalition to oppose Truman's labor-welfare-reform program. He has helped block action before on minimum wage increase.

← **JAMES E. MURRAY**
Senator from Montana. Labor's best Senate friend on Taft-Hartley revision, and an avowed social planner on jobless compensation, government in business, compulsory health insurance, minimum wage. He is far out in front of Truman on the steel expansion issue, with his bill to provide another 10 million tons of capacity right away.

MICHAEL KIRWAN →
Representative from Ohio. Most influential New Dealer on economic policy in the House. A "public power" man on appropriations committee, pro-labor on Taft-Hartley rewrite and minimum wage, would let business pay for increased government spending.

Affecting Industry . . . continued

← ARTHUR H. VANDENBERG

Senator from Michigan. He will use his big influence to discipline Republicans into not rocking the boat in terms of foreign policy, even if that means going along on higher taxes, materials controls to support the military at home, and foreign aid.

JESSE WOLCOTT →

Representative from Michigan. Listened to by Republicans more than any other GOP House member on all economic matters, public housing, controls, credit manipulations. He blocked Taft-Ellender-Wagner housing bill last session, was co-author of Taft-Wolcott voluntary allocations law.

← LESLIE BIFFLE

Secretary of the Senate. A close personal friend of Truman, and confidante of Barkley, his ideology is the political welfare of the Democratic party and he is one of the shrewdest operators on Capitol Hill.

MAURICE TOBIN →

Secretary of Labor. He ranks high with Truman because he gave up his ambition to run for governor of Massachusetts last year to accept appointment in the Cabinet at a time when practically no one expected Truman could win. Tobin will be the Administration's spokesman on what is wanted—and not wanted—in new labor legislation.

← OSCAR EWING

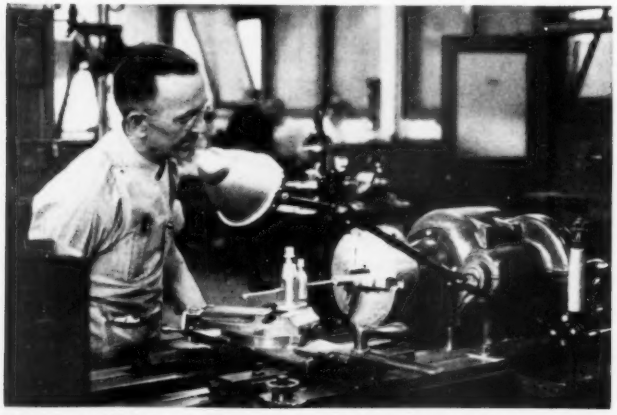
Federal Security Administrator. He is Truman's No. 1 man on most matters having to do with social welfare, will be the Administration's chief spokesman for that part of Truman's New New Deal. He is a professional politician, a former Democratic national committeeman from New England.

LEON KEYSERLING →

Member of the President's Council of Economic Advisors. A real old-time New Dealer in his philosophy, he has strong ideological ties both in the Administration and the Congress. His influence is within the small circle of planning advisors around the President.

LARGE-AREA LIGHT SOURCE is formed in the Security Council Chamber of the United Nations by lamp-shielding louvers that cover the ceiling

COLORED LIGHT from the fluorescent lamps in this inspection booth make it possible to do a better and quicker job of color discrimination



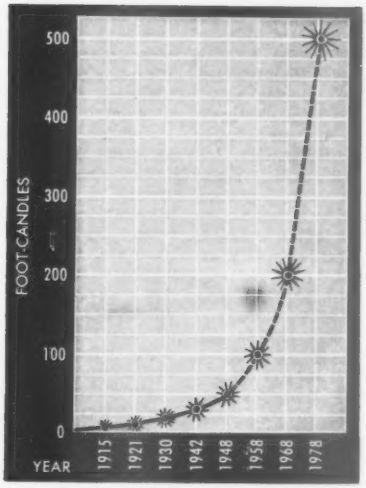
LOCAL LIGHTING is the answer when a high level is needed at points that are difficult to reach through the general lighting system alone

REDUCTION OF GLARE was fostered here by using concrete beams on the

HIGHER LEVELS, up to 150 foot-candles, are produced here by fluo-

ceiling as shields for lamps that provide 100 foot-candles

rescent units above these benches. General lighting is 30 foot-candles



FUTURE TREND? Today's 50 foot-candles may be 500 in 1978, says author*

What's Ahead in Plant Lighting

J. C. FORBES • ILLUMINATING ENGINEER, LAMP DEPARTMENT, GENERAL ELECTRIC COMPANY, NELA PARK, CLEVELAND

WHAT WILL GENERAL LIGHTING for industry be like 10, 20, or 30 years from now?

Today you probably think of fluorescent lamps when you think of factory lighting. But eleven years ago there were no fluorescent lamps. This year is the tenth anniversary of their introduction.

I cannot tell whether some other revolutionary advance in lighting may be expected in the next two or three decades. Certainly the efficiency of present light sources will be increased. It is likely that during the next ten years the efficiency of fluorescent lamps will be increased 20 per cent; mercury lamps, 20 per cent; and incandescent lamps, 10 per cent.

But assuming that we will have only the fluorescent, the mercury, and the incandescent lamps substantially as they are now, what changes in lighting practice is it reasonable to expect? Let's crawl a little way out on the limb.

Do you know of any better lighting today for seeing quickly, accurately, and comfortably than the thousand or so foot-candles of light out-of-doors in the shade of a building, or when clouds hide the sun?

Suppose the work in your plant were done out-of-doors in the late afternoon. The light would come from many directions, since the sky is a large-area source. Trees, fields, and fresh air would create pleasant surroundings.

A lightmeter near the work

*Values for 1915 to 1942 are included in the 1915 *Code of Lighting: Factories, Mills, and Other Work Places*, and in later revisions under the rules of the American Standards Association and the leadership of the Illuminating Engineering Society. They are based on visual tasks of medium severity. The values for 1948 and beyond are the author's estimates.

would show a level of illumination somewhere between 10 and 100 times what is being provided indoors today. Recommended practice today specifies 50 foot-candles for general manufacturing areas, whereas the lightmeter out-of-doors would register somewhere between 500 and 1000 foot-candles.

Hence, we should look forward to increases in the quantity of light, if they can be accomplished with comfort. The chart on the preceding page illustrates the past and probable future trend.

In addition to high levels of illumination, there is an advantage in having light come from many directions, as from the sky. Harsh and dense shadows are largely eliminated. Light penetrates deeper into the recesses of complicated parts. From such a source light is practically uniform in brightness. Reflected glare is negligible.

Lighting for Inspection

Under these conditions, a shiny piece of metal reflects uniform brightness, and slight blemishes on the surface can be detected readily. For example, especially high-quality, high-level lighting is required for the inspection of machined parts with close tolerances and a micro finish. Such inspections could be done easily on the roof.

For most purposes, it is as yet impracticable to duplicate natural lighting indoors, either in illumination level or in distribution.

Some attempts have been made in this direction. In relighting a plant recently, it was recommended that the fluorescent lamps be mounted in continuous rows on the ceiling and fairly close together. A diffusing medium was to be suspended beneath the lamps to smooth out the difference in brightness that would exist between them and the ceiling. Lighting levels on the order of 200 foot-candles were desired and obtained. So far, however, no satisfactory diffusing medium has been found that will also satisfy all requirements.

In another factory, where precision gages are made, the concrete beams on the ceiling were worked into the lighting system. Fluorescent lamps were mounted between the beams, and the ceiling was painted white. A level of 100 foot-candles has been obtained, and the shielding by the beams provides a high degree of comfort.

These are among the higher-intensity industrial installations to date. But note the limiting factors: 100 to 200 foot-candles of light, where more would be used if it were free and comfortable to work under; the great brightness difference between the lamps and their immediate background; the practical maintenance problems imposed.

The comments so far have referred to general lighting alone. How about supplementing it with special lighting, to furnish a high intensity over limited areas? After a good general base is provided, the additional lighting required often may be adequately supplied by special, supplementary units, properly located. Such local lighting removes the foot-candle limitations and in many cases will eliminate the quality complications.

There is one scheme, still little known in industrial application, that may help us to approach the ceiling of light.

The most familiar installation of this kind is in the Security Council Chamber of the United Nations at Lake Success, N.Y. The ceiling has numerous rows of low-brightness fluorescent lamps. Suspended below them, from wall to wall, is a system of louvers so arranged that no lamp is visible unless one looks directly overhead. These louvers are radically different in one respect from the familiar glass diffusing skylights. A glass skylight is almost always several times brighter than any other surface in the room, because all the light is supplied by the illuminated glass.

In the installation referred to, light comes *through* the louvers instead of *from* them, and as viewed from ordinary angles, the ceiling may be much less bright than the surfaces it illuminates. This kind of installation may help to solve many industrial lighting problems in the future, because it seems to be the most successful method yet devised for handling upwards of 100 foot-candles of illumination.

That such amounts of light are desirable for many seeing tasks is shown by recent studies that substantiate the standards in the American Recommended Practice of Industrial Lighting for seeing tasks involving the discrimination of fine detail for long periods of time under a fair degree of contrast. For these tasks an intensity of 50 to 100 foot-candles is recommended. Even higher levels of illumination are required for work in which there is poor contrast.

As you read this estimate about the future of general lighting for industry, do not overlook the importance of incandescent lamps in combination with high-efficiency mercury lamps. Each has an important contribution to make to good industrial seeing conditions. Used together, the blend of the mercury and incandescent light is superior to that given by either one alone. The color is more agreeable, and the intensity exceeds that obtainable from incandescent sources alone, with reasonable cost and comfort requirements.

It is entirely possible that plant men, architects, and illuminating engineers may, in the next 20 or 30 years, contrive satisfactory ways of approximating the ceiling of light.

White Light from Colored

Industrial lighting of the future also may vary greatly in appearance and practice from today's standards through the use of color.

Renewed interest in the physics of colored light sources and their effect on the surfaces they illuminate has produced some intriguing speculations that are beginnng to pay off in experimental installations. These speculations have revolved around the fact that white light is made up of all the colors of the spectrum. It was reasoned that if white light can be broken into rainbows of the solid component colors, it should be entirely practical to mix light of different colors —as from colored fluorescent lamps —and get white light. Obtaining this result simply meant retracing steps taken in physics laboratories for years. With modern lamps it was relatively easy to do. Why not apply this technique to commercial and industrial installations?

This step has been taken at Nela Park in a full-scale demonstration.

At 30 inches from the floor, the working level of a desk top or workbench, light of any desired color "temperature" can be obtained simply by the mixture of light from various colored lamps. As the lamps are turned on and off, the shade of the combined light varies.

If this principle were to be used in producing a ceiling of light, the effect would be a ceiling of variegated colors producing white light.

Mixed light is a tool of still unmeasured value for future lighting installations. It may become important to add attractiveness to working conditions.

Use of colored light in industrial processes will be important in the future. Many will remember the

fascinating childhood books in which pictures became filled with hitherto invisible creatures when viewed through a piece of transparent red material. This principle of emphasizing color differences by the use of different colors of light thrown upon the work has several practical variations. Some of them are producing startling effects, particularly in color printing and lithography where there is a critical need for accurate color separation.

Color-matching booths have been made on the principle of mixing light from numbers of colored fluorescent lamps with incandescent lamps. By using blue and white fluorescent lamps in the correct proportion, for example, a light of 10,000 degrees Kelvin is produced. This is a white light with a decidedly bluish cast. By using all incandescent lamps, light of 2800 degrees Kelvin (reddish) is obtained. By mixing them a color temperature of about 5000 degrees Kelvin is secured. This color, a white-white, is very close to what colorists would call "equal energy," in that the amount of energy produced by the combination of sources is practically constant throughout the visible spectrum.

Better Light for Color Work

Little use has been made so far of the well-established fact that materials of approximately the same color vary the most because of differences in hues other than the dominant one. For instance, two red paints that are not indentical will be different because of differences in the orange or green parts of the spectrum. Therefore, colored light may have an application in industry where it is necessary to inspect color more carefully or to do color matching.

Various colors in the work under inspection may be emphasized or diminished in strength under the color distortion of different light sources. Small units generating these different colors in equal energy levels are now available commercially. Later it may be possible to adapt the methods to other industrial processes where color differences are, or could be, important.

It seems apparent that color with adequate reflecting factor on factory walls and machines will be more generally used in the near future, along with other improvements that will make industrial plants more pleasant places in which to work. As this trend grows, it will cause more and more architects and industrial planners to learn the important fact that colors can be strengthened, diminished, and otherwise distorted by the color of the light that falls upon them.

Fluorescent lamps, for example, give off white light in a continuous range of color. Because of the visible mercury lines that penetrate the tube and its phosphor coating, white fluorescent lamps tend to emphasize slightly the blues and greens in the surfaces upon which they shine. Perhaps this usually unnoticed distortion can be corrected in the future. Researchers possibly can turn this effect to advantage, borrowing ideas from the makers of luminous paints, which glow more brightly because of the same mercury lines.

A few attemps have been made to utilize the near-ultraviolet energy available in all mercury lamps but usually screened out by the glass envelopes of those used in general lighting. At present it is most commonly used by "black light" artists and for theatrical effects. By selection of the proper glass envelope, this harmless near-ultraviolet could make selected areas glow or seem brighter when painted with special colored paint. Such paint would have the selected color when illuminated with visible light, but it would increase in brightness when illuminated with more ultra-violet.

The future may bring many applications for polarized light. It has been demonstrated that polarizing elements may be built into all-glass, sealed-beam-type automobile lamps. Industrial and lighting research may find uses for these lamps far different from those originally intended. Some uses already have been found for polarized light in the reduction of reflected glare from shiny papers.

The original impetus to experiment with polarized headlamps came from the desire to eliminate glare. Reduction of uncomfortable glare in industrial lighting is today one of the items receiving major attention from lighting engineers. Substantial progress has been made. It now seems probable that before long we shall become accustomed to hearing lighting engineers refer to the glare factor of a room in numerical terms such as 25 or 84 as a measure of eye comfort, much as degrees Fahrenheit long ago became an accepted indicator of another type of bodily comfort.

Tables now available establish the glare rating for representative types of lighting equipment when used under various conditions of room dimensions and illumination levels. With these tables it is possible to predict, before actually installing the equipment, that the addition of a simple longitudinal louver between the lamps of an ordinary industrial two 40-watt fluorescent lamp unit will cut the glare factor of the lighting system in two. Also, it is possible to predict that the use of a luminous reflector to reduce contrast between the lighting unit and its background will further reduce glare.

It is quite possible that the greatest progress of the lighting industry in the next 20 or 30 years will depend largely on its success in freeing offices and industrial plants from every trace of eye discomfort.

Lighting in the Future

I foresee in the future of industrial lighting:

1. Higher levels of illumination to produce brightness on the order of 300 foot-lamberts on the work and surrounding area. This standard may mean 500 foot-candles on materials with 60 per cent reflection factor or 1000 foot-candles on materials with 30 per cent reflection factor.

2. Larger-area light sources, pointing toward the "ceiling of light."

3. Wider use of mixtures of light from mercury, incandescent, and fluorescent lamps.

4. More color, both for general lighting, and for special processes where color matching and separation are important.

5. Reduction of discomfort glare.

However close the actuality may come to these guesses about the future, there is one prediction about future industrial lighting that becomes clearer every day. It is that the basis on which we decide whether we need this or that kind of lighting, and can afford it, will become more and more realistic and measurable. As more is learned about the ability of the human eye to see fine detail, as more factual data are obtained on the effect of light upon the total energy expanded by an individual in the job of seeing, as the knowledge of those factors relating to human comfort is expanded, and as light becomes less expensive, we may expect to see lighting recommendations based upon the actual requirements of the seeing task and designed to produce efficient, easy, seeing.

Close Scheduling Made Possible by Methods Study

Giving engineers full authority to make changes in equipment more than paid for the study of thousands of operations for this "small-quantity" run

MAKING A METHODS STUDY of the production of the 67-ton, $2,000,000 Stratocruiser airliners being built by Boeing Aircraft Company, Seattle, involved the preparation of 61 series of bar charts. Many of the series covered 3000 to 4000 operational elements, and took into account up to 300,000 different work elements.

Every element of every operation was studied. In the initial fabrication processes, some time elements were as short as the stroke of a punch press. In some of the final assembly operations, the time element was frequently as long as 5 or 10 minutes.

A job of this magnitude ordinarily might be undertaken only when a run of several thousand or even several million units was contemplated. In the case of the Stratocruiser, only 55 units were to be produced (with the possibility of subsequent orders for similar small quantities). Yet because methods engineers at Boeing work closely with factory supervision and have full authority to recommend changes in equipment and methods, the establishment of standards, particularly as they relate to cost, was more than worth while.

Time Study First Step

After first preparing estimates from blueprints, the methods engineers time each element of an operation with a stopwatch. This information is accumulated in a central card file. Information on a group of related operations is assembled by posting cards on a 15x20 in. Masonite work board. In fabrication or subassembly, one of these boards might be sufficient for an entire operational group, but in final assembly, where each operation may take weeks and comprise many work elements, six or more of the boards are clamped together end to end.

Upon completion of the studies of the operations in a single phase of manufacture, the methods engineers confer on the most efficient order of operations. The aim, of course, is to establish an orderly flow of work through the plant, taking into consideration such factors as division of workers into the most efficient groupings, maximum utilization of floor space, and simplicity of supervision.

Colored Cards Show Operations

Information from the file is transcribed on cardboard bars 1½ inches wide and 1 inch long, for each hour required for an operation. Various colors are used to indicate the type of work required —electrical, plumbing, etc. Information placed on the bar includes title of the operation, file number, part number, and standard minutes required for the size of working crew involved. The boards on which these cards are placed are faced with horizontal strips of transparent plastic, forming pockets in which the bars may be inserted. In some cases, Micarta is used; where this is done, a groove is machined into the board.

The boards are divided into vertical "positions" by a wire suspended from a clamp at the top of the board, and extending to a block running in a groove at the bottom of the board. Horizontally, the board is divided into "significant areas" by colored cardboard strips. The "positions" are the various physical stations the plane occupies on the assembly floor. The "significant areas" designate the distinctive parts of the aircraft such as main compartment, lower forward compartment, and so forth.

The bars are placed on the board, from left to right, in the sequence in which the operations occur and in accordance with the position of the plane at the time the work is performed. Each position is loaded as fully as possible, to secure full utilization of floor space and reduce elapsed time. When the board

SHOP CONTROL BOARDS ARE DIVIDED

VERTICALLY TO SHOW LOCATION ON FLOOR OF ASSEMBLIES, DESIGNATED BY HORIZONTAL POSITION ON BOARD

is completed in this fashion, supervisors of the shops concerned check the suggested sequence for practicability. After each time element has been verified by checking back from the board to the actual operation, black-and-white reproductions of the board are made by the company's blueprint division. These reproductions are posted in the appropriate work areas. Progress is recorded on the charts by blacking in the operations as soon as they are completed.

An additional assignment for the industrial engineers in connection with the Stratocruiser was devising an efficient method for ordering and reordering parts. The 55 Stratocruisers are being produced for six different airlines, with each line's planes differing greatly from the others. As a result, some parts are needed on planes for only one airline, sometimes for two, three, or all. To complicate matters, the planes are not manufactured for any one air line consecutively. Rather, deliveries are staggered by producing a few at a time for each airline.

To assure parts on hand when needed, and still not loading a shop down early in production with parts which would not be needed for some time, was an important and difficult assignment. The solution involved six sheets of cellophane, one for each airline. On each sheet were the numbers 11 to 66, the designations of the 55 ships. If a certain airline were to have ship 15, for example, its name would appear opposite that number on its sheet. In the other five sheets, a hole would be cut opposite that number. When the sheets were placed on top of one another, a single glance was enough to show the sequence in which parts should be ordered for each airline.

MERIT RATING FORM

RATING FOR _____

DEPT. CLOCK NO.

INSTRUCTIONS

1. Disregard your personal feelings. Judge this employee on the qualities listed below.
2. Study the definitions of each factor, and the various phases of each before rating.
3. Call to mind instances that are typical of employee's work and actions.
4. Using your own careful judgment — check the phrase in each factor that is typical.
5. If employee performs no supervision — do not rate additional factor for supervisory ability.
6. Explain on reverse side any unusual characteristic not covered in regular factors.

	FACTOR	RANGE					RATING
1	**QUALITY** Performance in meeting quality standards	Careless 4	Just gets by 8	Does a good job 12	Rejects and errors rare 16	Exceptionally high quality 20	
2	**JOB KNOWLEDGE** Understanding in all phases of his work	Expert in own job and several others 25	Expert but limited to own job 20	Knows job fairly well 15	Improvement necessary — just gets by 10	Inadequate knowledge 5	
3	**QUANTITY** Output of satisfactory work	Turns out required amount but seldom more 8	Frequently turns out more than required amount 12	Slow — output is seldom required amount 4	Exceptionally fast; output high 20	Usually does more than expected 16	
4	**DEPENDABILITY** Works conscientiously according to instructions	Dependable; no checking necessary 20	Very little checking 16	Follows instructions 12	Frequent checking 8	Continuous checking and follow-up 4	
5	**INITIATIVE** Thinks constructively and originates action	Good decisions and actions but requires some supervision 9	Minimum of supervision 12	Thinks and acts constructively; no supervision required 15	Requires constant supervision 3	Fair decisions — routine worker 6	
6	**ADAPTABILITY** Ability to learn and meet changed conditions	Prefers old methods; does not remember instructions 3	Learns slowly; reluctant to change 6	Normal ability; routine worker 9	Short period for mental adjustment; willing to change 12	Learns rapidly — adjusts and grasps changes quickly 15	
7	**ATTITUDE** Willingness to cooperate and carry out demands	Good team worker 10	Cooperative 8	Limited cooperation 6	Passive resistance 4	Poor cooperation; argumentative 2	
8	**ATTENDANCE** Amount of excessive absenteeism	2 to 3 days normal or 2 days own accord 6	1 to 2 days normal or 1 day own accord 8	No days lost 10	3 to 4 days normal or 3 days own accord 4	More than 4 days absence 2	
9	**SAFETY AND HOUSEKEEPING** Compliance with safety and housekeeping rules	Safe and orderly worker; equipment well cared for 10	Workplace clean and safe 8	Occasional warning about safety and orderliness 6	Warned repeatedly about safety and cleanliness 4	Area dirty; safety rules ignored 2	
10	**POTENTIALITY** Potential ability to lead and teach others	Has no more growth 2	Future growth doubtful 4	Slow development ahead 6	Bright future growth 8	Exceptional possibilities 10	
11	**PERSONALITY** Ability to get along with associates	Disagreeable 2	Difficult to get along with 4	Average or reasonable 6	Well liked and respected 8	Winning personality 10	
12	**SUPERVISORY ABILITY** Additional rating for supervisors only	Poor organization and planning 7	Inadequate supervision 14	Nothing outstanding 21	Good planning and effective organization 28	Outstanding leadership 35	

Date rated _____ Signed _____ TOTAL _____

USE SPACE ON REVERSE SIDE FOR REMARKS. EXPLAIN ANY RATING THAT IS ABNORMALLY LOW OR EXCEPTIONALLY HIGH

MERIT RATING FORM. Foremen are required to fill in a form for each of their men every three months. In order to avoid "catalog" ratings, point values are indicated in irregular progressions

Quarterly Merit Rating Tells Worker Where He Stands

A man can go farther if he knows he's on the right track. Merit rating, properly administered, tell weaknesses, strengths. Foreman knows him better

CLARENCE E. ALBERT • PERSONNEL DIRECTOR, UNITED SPECIALTIES COMPANY, CHICAGO

LESS CONFUSION, fewer employee gripes, and no playing of favorites —all this at United Specialties since a merit rating system was installed. In operation about three years, it has enabled foremen to know their men better, and has helped build a better understanding.

After carefully considering a number of different systems, management decided on merit rating as an equitable and efficient means of measuring the individual performance of each worker.

Four times a year every departmental foreman receives from the personnel department a merit rating form for each of his employees. The forms are usually distributed about the first of the month, and must be delivered by the foreman to the personnel department about the fifteenth of that month. They cannot be mailed.

Twelve basic factors are considered necessary in the performance of any job at United. On the form these factors are broken down into five degrees of efficiency, ranging from poor to excellent, with explanatory notes as a guide for rating. It will be noted (see form illustrated on facing page) that the point values are mixed in three different ways. Points go progressively up, progressively down, or irregularly up and down. The form is arranged thus so that the foreman is forced to give some real thought to his ratings. He cannot merely check down an "average" column, for instance.

When the form is completed, the personnel department calculates the point values. A master overlay rating card is used. The number of points earned by the employee is then transferred to his permanent record card, and the original form is filed in his folder for one year. In other words, there are four quarterly ratings in the individual's folder at any one time.

Most employees are much interested in how well they are or are not progressing. The department foremen spend considerable time going over the forms with each of their men.

Ratings Reviewed

They discuss such things as why the man was unable to perform his job efficiently, and just what steps can be taken to correct shortcomings; why he is absent or late for work; and why he is disliked by his fellow-workers.

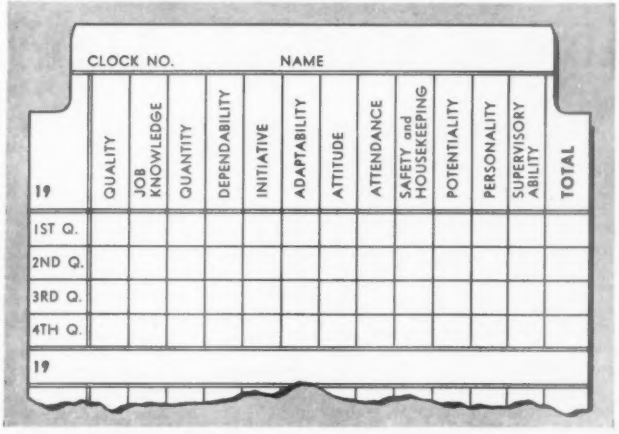
Likewise, the employee is told when he is doing a good job. Credit is given where credit is due.

At the end of the talk the worker gets a duplicate of the form for his own records. Management has stressed the point that workers must not exchange their personal merit ratings. They have been told that such exchanges might lessen their chances of promotion.

Merit ratings are used by management to effect employee transfers, promotion, wage increases, and layoffs. They make a sound basis for decisions regarding individual employees—and they eliminate playing favorites.

They are used also in cases of employee grievances. If the worker is not up to the maximum wage scale, his rate is reviewed every six months automatically. The number of points earned on his merit rating determines to a large degree whether the worker receives a wage increase. Merit ratings are used, too, in deciding which employees are likely material for supervisory jobs.

Another use for the merit ratings has been found in settling arbitration cases. Many times the union has asked the privilege of looking at the records. Management has been told that the records are helpful in settling disputes.



A COMPLETE RECORD of his merit rating "scores" is kept in the employee's record file. Actual forms are held for one year

1 GATHERING SCRAP. Container for metal sweepings used in all shop areas of plant has screen which separates larger parts from general debris

2 SORTING BY SIZE. Revolving perforated cylinder sorts parts according to size. Parts drop into collecting pans

3 SORTING BY COMPONENTS. After screening, parts go to sorting tables for sorting by identity. Girl breaks down miscellaneous parts into pans for final sorting

Better Salvage Methods Mean

Annual savings, $300,000. Made possible by a fully responsible conservation department with a fresh approach and new methods

J. ALLEN WOOD • CHIEF OF CONSERVATION, THE GLENN L. MARTIN CO., BALTIMORE

RE-EXAMINATION of an already profitable materials salvage program at the Glenn L. Martin Company revealed that it could be made to yield even greater savings. Radically different methods of sorting scrap materials were developed that have made possible new and substantial recoveries. At the same time, new or improved methods have increased quantity and improved quality of work—and with fewer people.

Responsibility for the entire materials salvage program is vested in the conservation department. This department consists of nineteen people, including supervision and a secretary. Seven of these people perform duties that have no direct bearing on salvage, such as hauling trash and similar jobs. The remaining twelve people perform all the direct salvage activities.

Value of the current salvage program is best illustrated by the savings effected by the conservation department for one year. These figures do not include substantial cash returns on sale of metal scrap, paper, and so on.

4 FINAL SORTING of bolts takes place at this station. After cleaning, bolts are gaged first for diameter and then for length. Stock pans in rack have been provided for all commonly used bolts. Girl sorters use gages shown on next page. Method and work simplification procedures make salvage like this pay

Bigger Recoveries at Lower Cost

Salvage Savings for One Year	
Nuts, bolts, standard items, etc., returned to stock	$120,912
Material re-used from scrap and trash	151,843
Wood salvaged and re-used	23,292
TOTAL	$296,047

The first item of $120,912 represents the return to stores of 3,107,673 good and usable nuts, bolts, etc., recovered from floor sweepings at a direct labor cost of only $10,459. These are items that must be precisely manufactured and therefore are not cheap.

Simplification of the sorting methods gets the credit for economical recovery. It was achieved by discarding known scrap sorting methods in the search for efficient ways. Everything was rearranged; new tools and gadgets were devised; waste motion was eliminated at every step. The new procedures utilize four girls instead of ten formerly needed for less effective work. The direct labor cost includes a man who identifies and routes material back to stores, and it also covers handling costs in accumulating the materials.

Parts sorting by the new method is now basically simple. Screened containers are provided throughout the shop area, in which all floor sweepings must be screened by the sweepers as shown in Figure 1. This material is then picked up by the conservation department and delivered to the parts sorting area. There it is run through a revolving screen with graduating apertures, as shown in Figure 2. The screened material is then broken down into its basic component parts, such as "Army-Navy" bolts, clevis bolts, screws, fittings, etc.

CONTINUED ON NEXT PAGE

This hand method of breaking down parts enables the operator to eliminate damaged parts.

The sorted material is now cleaned, and then each group of parts is further sorted. Bolts, for example, are sorted first for diameter and then for length, as shown in Figure 4. These sorting operations are simplified by use of specially designed gages below. Inasmuch as the company uses A-N bolts of varied manufacture, the length of these bolts is not constant. Therefore, any mechanical device for sorting these bolts by tripping (according to over-all length) does not work well. The critical dimension is the length of shank. The length-sorting gage illustrated allows for rapid sorting by shank dimension as well as for rigid inspection, after which the bolts are returned to stores.

Scrap Collection

Vigilant methods for screening all scrap and trash has resulted in the second item of savings of $151,843. This screening includes all plant-generated trash, all cut-offs and scrap from manufacturing processes, and all obsolete, surplus, defective material or equipment that has no sales value in its original state. All such material is checked before its removal from the plant for items capable of reuse, either in their original form or as a substitute for other needed material. Many test items are now obtained from salvage.

In the collection of scrap, rigid segregation is maintained that has practically doubled the value of scrap sold. For this purpose, containers for the various alloys of scrap have been placed throughout the plant. Scrap material is then hauled to a central disposal area, where it is screened for usable items, checked for segregation, and then loaded on purchasers' trucks.

AVAILABLE SOON

1948 Index to

FACTORY

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Address the Editor

At the scrap disposal area the conservation department also operates a large incinerator for the economical disposal of trash, debris, and confidential material. Methods studies were made for the salvage of the non-confidential material, paper, etc., and methods were set up whereby this material could be screened from the trash and sold as scrap. This in the main was accomplished by providing separate containers for segregation of the material where it is generated. Incinerator operators were instructed, too, to remove the better grades of paper from the accumulated trash to be burned. During the past year, the conservation department has processed and sold 1,148,522 pounds of paper made available this way.

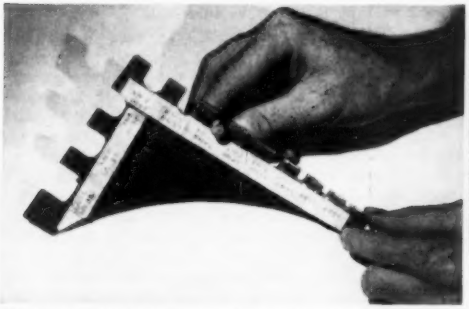
Wood Salvage

An efficient wood salvage area has been set up, and all discarded wood, scaffolding, etc, is screened for salvage possibilities. All salvaged wood has the nailed ends cut off, and is then neatly stacked. During the past twelve months, 461,481 feet of usable, seasoned lumber was re-used throughout the plant. All wood that is unsalvageable or too costly to salvage is sold to an outside dealer, made available to the employees.

Constant studies are being made by the conservation department to eliminate waste and spoilage at its source. Through its efforts the scratching and marring of airplane skins throughout the plant has been practically eliminated. It has also made studies of various other items that affect or are incidental to the cost of airplane building, such as nesting of material (for spoilage reduction), handling of rivets (for waste reduction), use of wiping cloths (for better service), and various other studies.

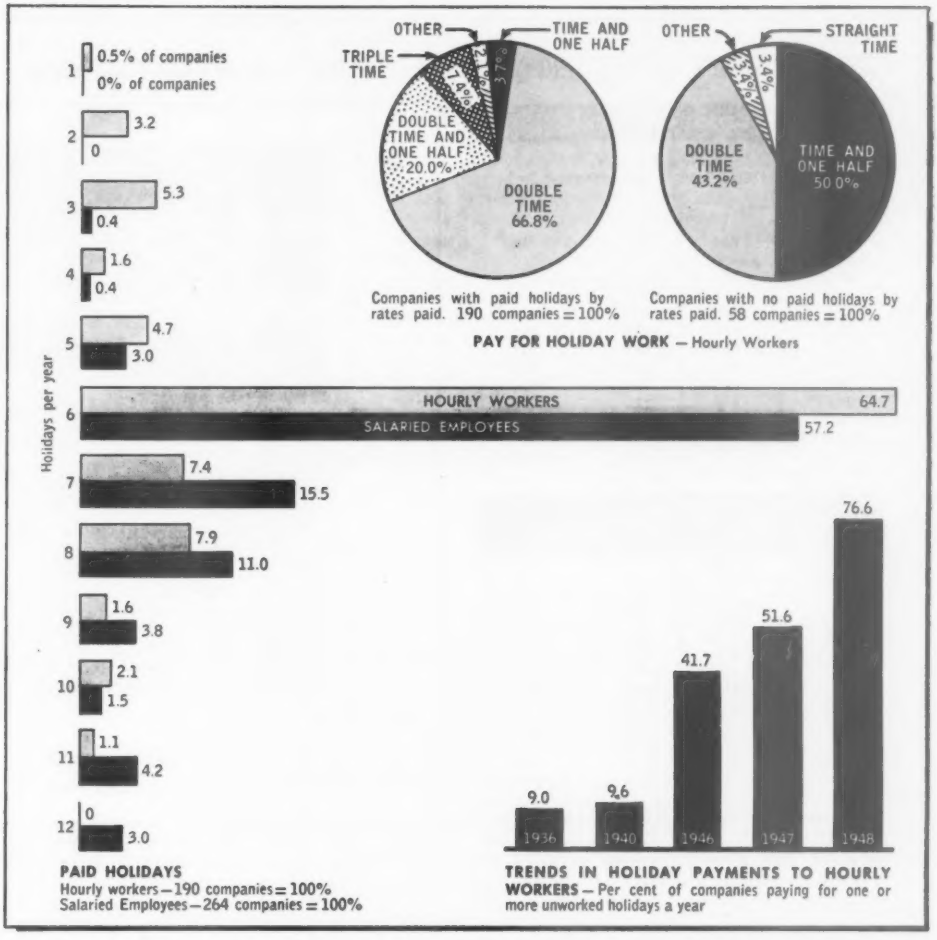
Wiping cloths can be taken as a good illustration of how these studies function. It was found that the company was using waste rags which were laundered for re-use because they were expensive. Many of these re-used rags were found unsatisfactory for polishing purposes as they retained metal particles even after laundering. Replacement cost was high. Also the metal particles were a frequent source of injury to employees handling these rags. Studies were made of a rental wiping-cloth service which provides towels of a different color for use in the machine area where chips are generated. This service was instituted and for the first 8 months saved $14,511, eliminated scratched surfaces and hazards to employees.

As another result of waste elimination study, sheet material is being laid out to utilize nearly every square inch simultaneously for various parts, as compared with the old practice of cutting only one part and using the scrap later.



DIAMETER GAGE facilitates the sorting of bolts according to diameter. Made of metal, it is light and handy

LENGTH GAGE results in greater speed and accuracy in checking the length of bolts



Holiday Observance and Pay Practices—U.S., 1948

SIX PAID HOLIDAYS a year is majority practice for both hourly and salaried employees. These holidays are usually New Year's Day, Memorial Day, July 4, Labor Day, Thanksgiving, and Christmas. Where an hourly employee is required to work on a paid holiday, the majority of companies are paying him a total hourly rate of double time.

The marked increase in holiday payments to hourly workers during the past eight years can be attributed in part to wartime wage stabilization orders and to "holiday package" wage agreements since the war.

SOURCE: The National Industrial Conference Board's "Road Maps of Industry" Series. Copyrighted by the Board and reproduced with special permission.

TABLE AND CHART FOR RELATING QUALITY PERFORMANCE TO INCENTIVE PREMIUM

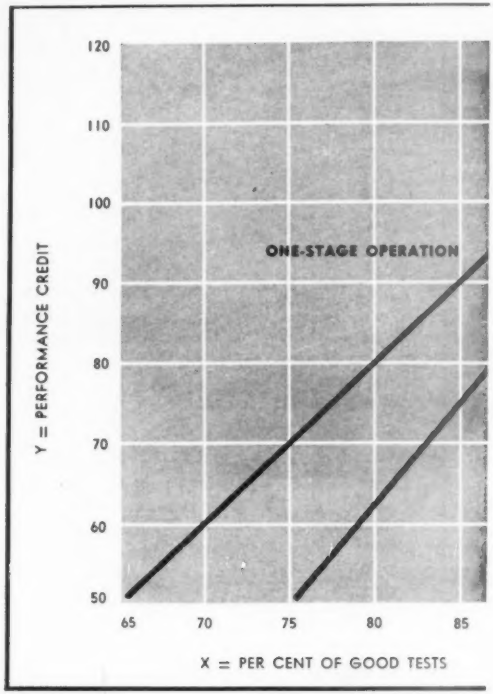
ONE-STAGE OPERATION

X = Per Cent Good Tests, Y = Performance Credit

X	Y	X	Y
65.0	50.0	78.0	76.0
66.0	52.0	79.0	78.0
67.0	54.0	80.0	80.0
68.0	56.0	81.0	82.0
69.0	58.0	82.0	84.0
70.0	60.0	83.0	86.0
71.0	62.0	84.0	88.0
72.0	64.0	85.0	90.0
73.0	66.0	86.0	92.0
74.0	68.0	87.0	94.0
75.0	70.0	88.0	96.0
76.0	72.0	89.0	98.0
77.0	74.0	90.0	100.0

RE-PULPING AND RE-CRYSTALLIZING OPERATIONS

X	Y	X	Y
75.0	50.0	85.0	75.0
76.0	52.5	86.0	77.5
77.0	55.0	87.0	80.0
78.0	57.5	88.0	82.5
79.0	60.0	89.0	85.0
80.0	62.5	90.0	87.5
81.0	65.0	91.0	90.0
82.0	67.5	92.0	92.5
83.0	70.0	93.0	95.0
84.0	72.5	94.0	97.5
		95.0	100.0



QUALITY ELEMENT of incentive pay plan is based on percentage of good tests of samples submitted to laboratory for analysis. There is a minimum standard, which differs in the several departments, below which

Incentive in Process Industry Gives 100 Per Cent Coverage

J. W. BRADY • CHIEF ENGINEER, EMERY INDUSTRIES, INC., CINCINNATI

THE PRINCIPAL HANDICAP to the use of incentives in the processing industries is the difficulty in measuring volume of output and relating the quality of output to graduated payments.

These problems have been solved at Emery with the result that we now have in operation an incentive plan (based on departmental groups) which provides the following advantages to the employees and to the company.

To employees:

1. Complete coverage of all direct and indirect labor, except maintenance employees.

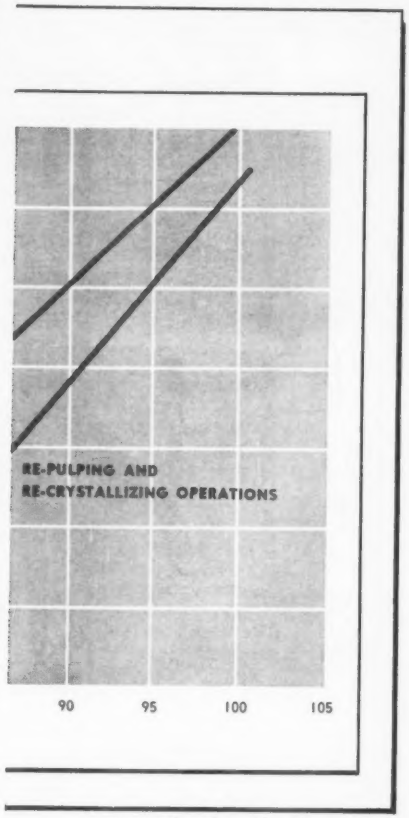
2. Each individual is on standard 100 per cent of the time.

3. Earnings average about 20 per cent incentive premium.

(Under the old plan, coverage never exceeded 20 per cent of the total possible, and individual earnings were highly variable.)

To the company:

1. Unit manufacturing costs have not risen despite an increase of $0.30 in the basic hourly labor rate.



no premium is paid, and maximum may exceed 100 per cent

2. There is better control of quality. Yields of desirable by-products have increased; undesirable by-products have been reduced.

3. Cooperation within departments has increased, as has interdepartmental cooperation, because there is recognition that expediting materials in and out of departments will increase opportunities for incentive pay.

4. Supervisors find their administrative burdens lessened because workers have an increased desire to meet and exceed the quality and quantity incentive standards.

5. Production has shown an almost constant upward trend.

First step in the establishment of the incentive pay was the determination that it should be on a departmental group basis, and that the premium should be figured monthly. There were several reasons for this latter decision, perhaps the most important being to avoid inventory fluctuations.

For example, a tankful of material at 150-deg. F. weighs considerably less than the same tankful of material at 110-deg. F. Add to this the fact that different materials have different specific gravities, and the problem becomes even more complex. We do, of course, take daily and weekly inventories, but while an inventory error of, say, 50,000 pounds is well under 1 per cent on a monthly basis in any department, the same error on a weekly basis would amount to perhaps 3 or 4 per cent.

Additionally, the monthly basis tied in with our accounting practices, because our budgetary control called for monthly analyses of budget performance. Thus we could rely on the accounting department to furnish production figures, rather than reporting less reliable figures.

Before the plan could be put into operation, we also needed detailed information regarding equipment specifications and capacities. This was particularly important in departments employing a continuous, rather than batch, process. The information was all catalogued and used in setting standards.

Specifications and operation manuals from the chemical division and control laboratory included not only properties of finished products, but detailed information about the product at each individual operation. Quality performance in each department is checked continuously against these standards by submitting samples to the laboratory for analysis. The results are tabulated in daily control reports, which are later used for incentive computations.

How the Plan Works

As it relates to quantity, the operation of the incentive plan differs little from those in use in other industries. For example, assume that a department has a standard of 0.30 hours per 1000 pounds. If, during a month, 6,000,000 pounds are produced with an expenditure of 1500 man-hours, then the *quantity* performance would be determined as follows:

$$\frac{6{,}000{,}000}{1500} \times \frac{0.30}{1000} = 120 \text{ per cent}$$

As it relates to quality, the plan is markedly different from those in other industries. Since tests are run continuously, it was determined that the premium would be related to the percentage of good tests, with a minimum standard of good tests. In most departments, this minimum standard is 70 per cent, although as indicated by the accompanying chart, it will vary slightly in the different departments, being determined by the relative difficulty of achieving good tests under the existing processing and equipment conditions. When the quality performance falls below this standard, no incentive payment is made, regardless of quantity performance. Conversely, there are some departments in which it is not necessary to achieve 100 per cent good tests in order to receive 100 per cent quality credit.

To illustrate, assume that in the example cited above, 70 per cent was the minimum, and 95 per cent good tests was optimum expectation; then quality credit would be:

Per cent good tests	Per cent credit
70	50
75	60
80	70
85	80
90	90
95	100
100	110

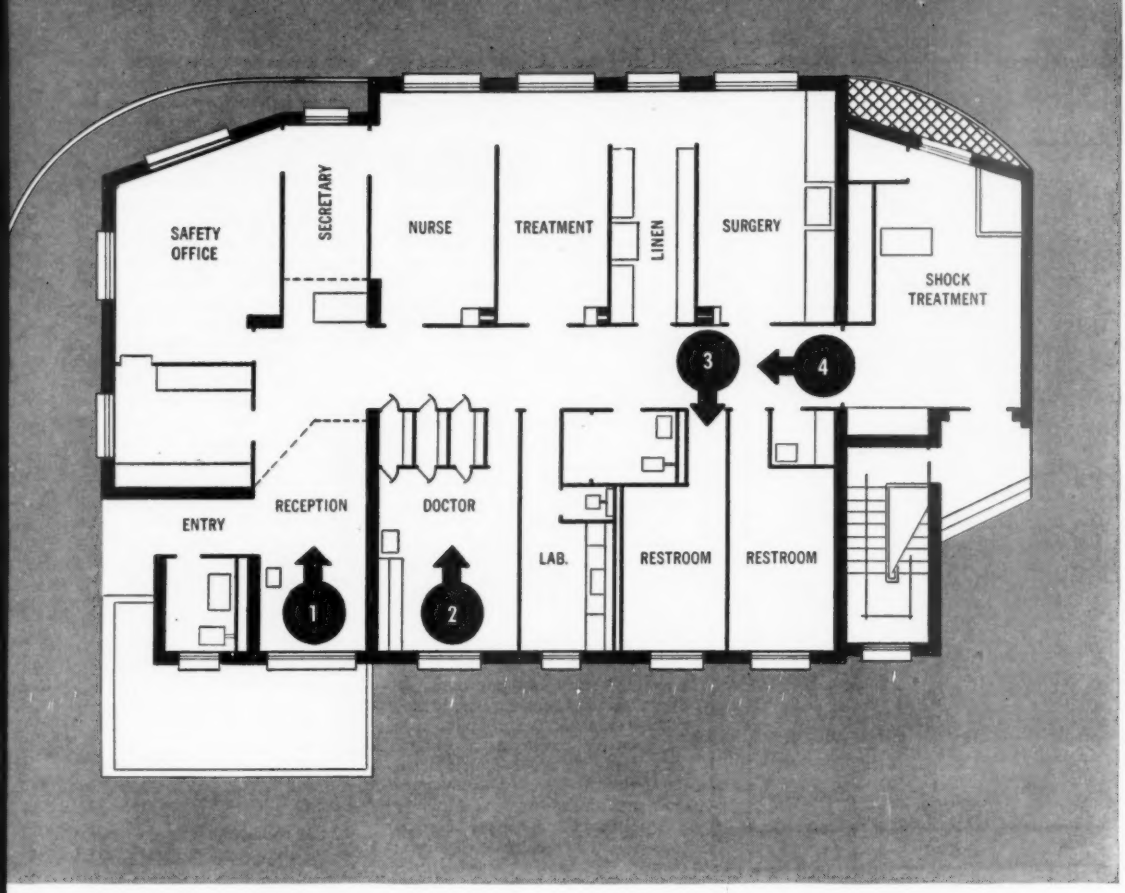
If the department in the example registered 90 per cent good tests, then its quality credit would be 90 per cent. This would result in an 18 per cent incentive premium, calculated as follows:

$(120-100) \times 1.10 = 22.0$ per cent

Again, if the department registered less than 70 per cent good tests, no premium would be paid. Or, if it scored 100 per cent, the premium would have been:

$(120-100) \times 1.10 = 22.0$ per cent

In some departments, we include not only quantity and quality performance, but also such factors as yields of by-products, consumption of process chemicals, and usage of such utilities as gas, steam, electricity, and fuel oil. These additional factors are used chiefly where they account for a considerable proportion of the cost. In some cases, they are used only for calculating the foreman's incentive premium; in other cases, they apply to the operators as well. (It is to be noted that all foremen as well as operators have been put under this incentive plan.)



LAYOUT of Staley safety and first aid building. Numbers refer to photographs at right. Arrows indicate direction of camera's aim. Shock treatment room is equipped with hydrotherapy tub

Central First Aid Building

ROY L. ROLLINS • DIRECTOR OF PERSONNEL, A. E. STALEY MANUFACTURING COMPANY, DECATUR, ILL.

INTENT on providing its employees with the finest possible emergency medical treatment, A. E. Staley recently completed a $100,000 safety and first aid building.

The building contains a room for treating minor injuries, a surgery room, a receiving room where treatment for shock and burns may be given, two restrooms with two beds each, a laboratory, and a special room for physical examinations. Restrooms are for use by patients the doctors wish to keep under observation for short periods. Also in the building are the office of the safety director and the stockroom for safety equipment furnished by the company and safety shoes sold at cost to employees.

Dressing rooms are designed to afford maximum privacy to all patients receiving examinations. Employees to be examined are ushered to one of three small rooms opening into the corridor. They lock the hall door from the inside and prepare for the examination. When the doctor's office is cleared of other persons, the doctor on duty unlocks the door opening into his office from one of the three dressing rooms and admits his next patient.

Lock-wheel stretchers are used in the building to facilitate the moving of bed patients. There is a modern counterbalanced overhead operating light in the surgery room. Other equipment includes various

1 RECEPTION ROOM. Vent (at top) is part of filtering system which maintains fresh air supply

2 EXAMINATION ROOM. Private dressing rooms are at rear left center. Each room has a wall seat

3 RESTROOM. Two of these tastefully furnished rooms are for patients who remain for short periods

4 CORRIDOR looking toward reception room and offices. Doors to dressing rooms are at left center

Insures Prompt Care

treatment chairs and a unit sterilizer for towels and linen, instruments, and water. In addition to a linen room, large storage cabinets have been installed throughout the building.

The first aid building is open at all hours, seven days a week. Serious accidents are reported to the first aid office by telephone. A stretcher truck is maintained in readiness for emergency calls. Any part of the company grounds can be reached from the centrally located first aid building within a few minutes.

EXTERIOR, WITH LANDSCAPING INCOMPLETE. BUILDING IS IN HEART OF PLANT

PROPANE GAS standby equipment at Caterpillar Tractor Company, Peoria, Ill., comprises 18 tanks of 30,000 gallons capacity each. At present consumption the plant could run 18 to 20 days on this gas alone

Standby Equipment Puts

Some of the emergency equipment and measures that can be called upon to provide power, gas, and compressed air when the regular supply fails

G. A. VAN BRUNT • ASSOCIATE EDITOR

PREPAREDNESS TO MEET shortages or interruptions of essential services—electrical energy, gas, air—before they occur, often pays off in a big way. It may involve the installation of suitable standby equipment, the creation or location of other sources of supply, or simply drawing up plans that can be put into effect with minimum delay when an emergency develops. At times when such action is essential, there may be little opportunity for careful, unhurried planning.

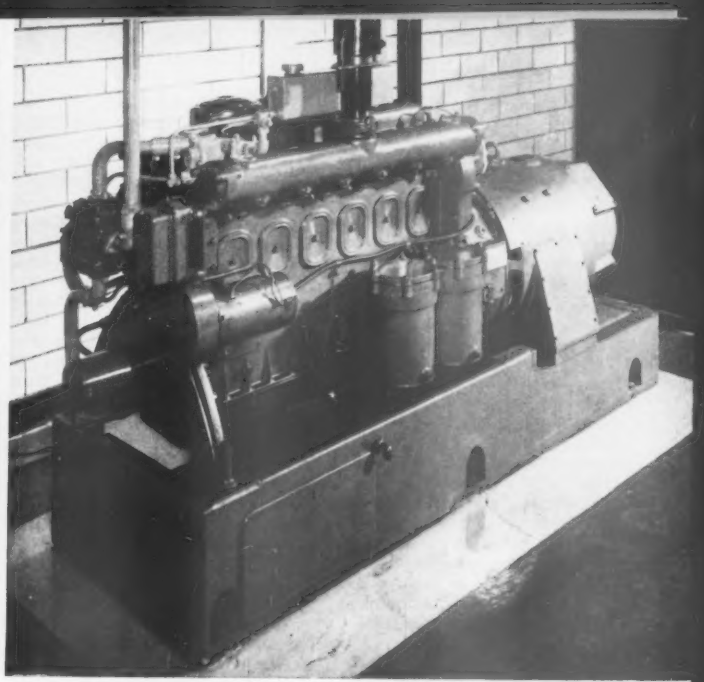
In plants that buy all their electrical power, the failure of the supply is likely to disrupt operations completely, if no standby source is available. In many plants a power outage causes little or no damage, aside from the loss of production. However, there are many other plants where the stopping of certain processes or equipment is certain to result in loss of materials or products, and possibly damage to machines. In any event, a serious situation arises, especially in hazardous areas, when the lighting system goes out.

In windowless plants or enclosed areas where artificial lighting is required even in the daytime, loss of light exposes personnel to serious hazards, if no provision has been made for emergency lighting. On night shifts in other plants, loss of light makes a bad situation.

Emergency lighting for exits and critical areas can be provided in a number of ways. Small gasoline- or diesel-engine-driven generator sets can be had in ratings from about 3 kw. up. They can readily be arranged to start automatically upon failure of the regular power supply, and are a reliable source of power in emergencies.

Turbo-generator sets are available in ratings of 5 kw. up. If conditions are suitable, such units may be used in place of an engine-driven generator.

Considerable use is made of storage batteries as sources of power for emergency lighting. In power plants and substations, particularly, the batteries used for operating circuit breakers and oil switches also may be employed to energize emergency lights. Of course, lights in other places also can be supplied from this source.



A 60-KW. DIESEL-DRIVEN UNIT supplies emergency lighting at Hotpoint, Inc., Detroit. Lamps are spaced 100 feet apart in low bays and boiler room

Emergencies to Rout

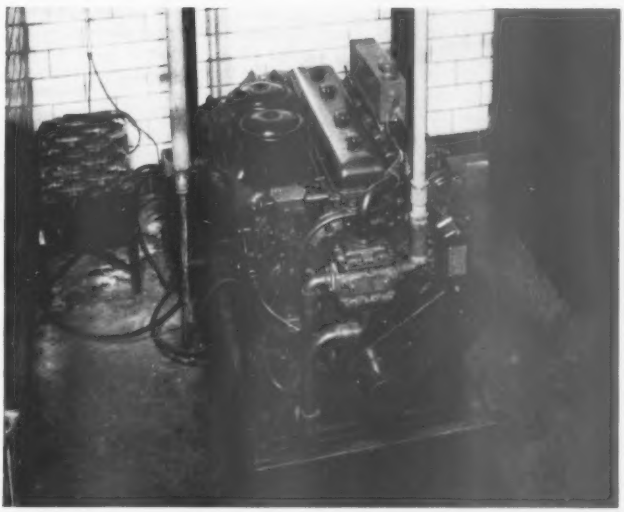
Storage batteries may be kept primarily or solely as a standby source of power that is automatically cut in when power goes off.

Where the emergency lights should be placed, depends on the conditions in the individual plants. It is usually considered advisable to install them in boiler plants and switchrooms or substations, in hazardous or congested areas, around machines, in first-aid rooms, and usually at stairways and exits.

For more general illumination, floodlights connected to some emergency power source may be installed at suitable spots. They will be connected to an emergency lighting circuit that may or may not be automatically switched on.

Battery-operated portable floodlights may play an important role in emergencies. They can be set up wherever needed.

Recently available is an emergency lighting unit that is normally plugged into any standard 110/120-volt outlet. If the power goes off,



WHEN POWER GOES OFF at General Electric X-Ray Corp., Milwaukee, 300-watt lamps in the plant and offices are supplied by a 60-kw. emergency set

the unit is automatically switched on. It comprises two independently movable floodlights, powered by one 9-volt dry battery, mounted on a steel housing.

Electrical industrial trucks fitted with automobile-type headlights have been pressed into service during power or lighting system outages. As soon as the lights go out, trucks are driven to previously selected strategic locations, where they remain as long as need exists.

If a plant contains processes or equipment whose unexpected stoppage may cause damage, interruptions in the power supply become a serious matter. Provision of an emergency source of power is then a necessity.

Plants that formerly generated all or most of their power, and later changed over to utility power, often keep one or more of the old generating units to handle peak loads and emergency requirements. This is frequently a wise move.

Power for Essential Loads

Where the demand for process steam is considerable, installation of an engine or turbo-driven generator of sufficient size to carry all essential load is worth considering.

If the demand for process steam is slight, or other conditions are such that it is not feasible to install a turbo-generator, a gas-, gasoline-, or diesel-engine-driven generating unit will serve very satisfactorily. Gasoline-driven sets are available in ratings from about ½ to 100 kw. Diesel engine units available for standby service range from 2½ to around 150 kw.

Where a unit is to serve solely as a standby source of power during outages, the usual practice is to have it driven by a gasoline engine. If desired, engines using other fuels—gas, kerosene, or distillates—can be had.

When selecting an engine-driven standby generating unit it is necessary to estimate closely the size of the load to be carried. It is also advisable to allow some excess capacity. As a plant expands or new processes are introduced, the loads that must be supplied are likely to become larger.

Failure of the natural or manufactured gas supply likewise poses serious problems in many plants. In some parts of the country gas is used for generating steam for heating or process. Everywhere it is widely used for heat treating, drying, baking, and other purposes.

Various measures have been employed to keep certain kinds of gas-fired equipment operating in emergencies. For example, drying and low-temperature baking ovens have been provided with steam coils or electric heaters. Oil burners also have been installed, particularly on high-temperature applications such as heat-treating or melting furnaces. Of recent years, the use of liquefied petroleum gases, both during emergencies and to supplement or replace the regular supply of gas, has increased greatly. With a supply of these gases on hand and suitable equipment for utilizing them, a plant need suffer little inconvenience or loss of production if a shortage or failure of the regular supply occurs.

Propane and butane are the two most important liquefied petroleum gases. They are obtained during the refining of crude oil and from natural gas. Both are gases at ordinary temperatures and pressures. Under moderate pressure they become liquid, in which form they are shipped and stored. Frequently mixtures of butane and propane are used.

Of the two gases, propane is the lighter, the commercial grade having a boiling point of -44 deg. F. at atmospheric pressure. At 70 deg. F. it develops a pressure of about 124 lb. per sq.in. gage. The heating value is about 2520 B.t.u. per cubic foot.

Butane has a much higher boiling point, 32 deg. F. at atmospheric pressure. It develops a pressure of about 34 lb. per sq.in. gage at 70 deg. F. Heating value is around 3260 B.t.u. per cu.ft., for the commercial grade. Manufactured gas, on the other hand, gives up to about 550 B.t.u. per cu.ft. Commercial mixtures of butane and propane average around 3000 B.t.u. per cubic foot.

Gases Stored as Liquid

On the market, liquefied petroleum gases are available in cylinders of 100- to 150-lb. capacity, which are returned for refilling when empty. When larger quantities are required, either for immediate use or storage against emergencies, the gases in liquid form are delivered in special truck or tank cars. Capacity of the tank cars ranges from 8000 to 12,000 gallons.

Storage tanks for the liquefied gases may be of any capacity up to 30,000 gallons. More often they are around 18,000-gal. capacity. They are commonly located above ground out in the plant yard.

When liquefied gases are used primarily as an emergency supply, it is advisable to install sufficient storage capacity for a month's operation, or for the duration of any likely shortage or outage.

The liquefied gases are transmitted from storage to the burners in vapor form. Although the liquid form changes to the gaseous state at comparatively low temperatures, the usual practice is to use a vaporizer in order to assure a steady, uniform supply of gas. Heat required by the vaporizer in performing its function may be derived from the ground or the surrounding air, from steam or hot water, or from a gas flame.

Before use, the gas may or may not be diluted with air.

Depending on the requirements, the combustion system may burn the gas at pressures ranging from a few inches water gage to 30 lb. per sq.in. gage, or more.

Loss of compressed air service can be a serious matter in many plants, because it will shut down spraying operations and prevent the use of hoists, chucks, pneumatic tools, and various other kinds of air-operated equipment and devices. Since plants usually have more than one compressor, one or more units being held in reserve as standbys and to handle peak loads, complete loss of air service is not likely to occur. However, a breakdown of a large compressor or its driving engine or motor may cause a sharp curtailment of supply.

The result may be such low pressure that the efficiency of all air-operated equipment is drastically reduced.

Replacement of a defective driving motor usually is not a difficult matter. If the trouble cannot be cleared up quickly, however, a plant will have the alternative of reducing or eliminating the less essential uses of air, or supplementing the supply in some way. The latter alternative can be handled in two ways: (1) Small portable motor-driven outfits may be installed locally to handle one or more pieces of air-operated equipment or pneumatic tool lines; (2) larger portable engine-driven units may be connected to the compressed air system to supply the entire plant. Such units usually can be rented from local contractors, if the plant does not own any.

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To cover the extra cost of disability pay and higher old-age pensions, Truman asks Congress to boost the 1 per cent payroll tax on employer and worker to 1½ per cent on July 1 instead of next January 1, as scheduled. Earnings would be taxed up to $400 a month instead of present $250 lid.

What will Truman—and labor—get from Congress? Health insurance—*no*. Disability pay—*maybe*. Better pensions and unemployment insurance—*yes*. Also higher payroll taxes.

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***At the bargaining table*, union negotiators will push pensions and social insurance demands the hardest. With jobs insecure and living costs heading downward, welfare benefits carry more urgency than higher wages.**

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Reuther's program reveals two devices other unions may use in fourth-round negotiations:

1. Wage demands—about 15 cents—will be based on restoring real wages to what they were in June, 1946, when OPA died. To base them on living cost changes since the last settlement wouldn't net anything.

2. Where union contracts are reopenable only on wages, employers will be asked to agree to discuss welfare benefits also. If those employers insist on sticking to the contract limitation, UAW-CIO negotiators will add the cost of a welfare and pension plan—another 15 cents—to the hourly wage demand.

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LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

More and better social security protection. That's what organized labor is really out to get this year.

It wants Congress to provide a better basic minimum floor so that a worker will be protected no matter where he works.

On top of that, labor wants employers to build tailored benefits and seal them in union contracts.

From a friendly 81st Congress, the labor leaders want the Truman social security program. Here it is:

1. Compulsory health insurance covering 125,000,000 persons. To start this off with a $260-million kitty, Truman would put a one-fourth of one per cent payroll tax on both worker and employer.

2. Disability benefits up to $45 a week. Like health insurance, this is a new type of benefit not now part of the government's social security program.

3. Extension of old-age and survivors' insurance to cover 25,000,000 workers now excluded from federal benefits. Also: Double the average $25 monthly payments.

4. Liberalize the federal-state unemployment insurance program. For this, employers pay an average payroll tax of 1¼ per cent, the worker nothing.

To cover the extra cost of disability pay and higher old-age pensions, Truman asks Congress to boost the 1 per cent payroll tax on employer and worker to 1½ per cent on July 1 instead of next January 1, as scheduled. Earnings would be taxed up to $400 a month instead of present $250 lid.

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Three principles CIO sets down to guide its negotiators on social security issues:

1. Get the employer to contribute a definite amount.

2. Have the money put into a trust fund so it will be used only for social security benefits.

3. Get an equal voice in developing and operating the welfare program.

Here's a tip: If you want to deduct the cost of welfare benefits for tax purposes, better get an O.K. from the Bureau of Internal Revenue. Besides meeting Revenue's regular tests, your plan mustn't violate any other law.

Internal Revenue has been turning down some plans. Even John L. Lewis' $100-million-a-year welfare fund hasn't been approved yet. Internal Revenue wants to know first if it violates Taft-Hartley.

•

Keep your eye on Walter P. Reuther's auto workers. By March, General Motors members stand to lose the 3-cent cost-of-living raise they got in September. That's because of the two-year escalator clause. By June, they likely will give up some of the 11-cent boost they won last June.

To cushion the shock of missing a wage increase for the first time since the war, GM workers are getting a sales talk from Reuther: Lower prices benefit workers more than wage increases.

UAW-CIO therefore puts welfare benefits at the top of its economic demands this year. First is a pension plan. Second, a program of health, hospitalization, medical, surgical, disability, and life insurance provisions. And last, a wage increase.

•

Reuther's program reveals two devices other unions may use in fourth-round negotiations:

1. Wage demands—about 15 cents—will be based on restoring real wages to what they were in June, 1946, when OPA died. To base them on living cost changes since the last settlement wouldn't net anything.

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LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Good business in 1949 depends heavily on Congress.

That fact is highlighted in the McGraw-Hill survey of "Business Needs for New Plants and Equipment," reported on page 86 of this issue of FACTORY. It also stands out of the President's budget, if you dig into what's behind the figures.

The survey shows that industry *plans* to invest almost as much in 1949 as it actually invested in 1948. Moreover, it has plans now to invest a total of about $55 billion in the next five years. The total of those plans is remarkable. It is, even when adjusted for price changes, two-thirds larger than the amount actually spent to improve and expand industry in the five years 1936-40. Moreover, if good business continues, plans will be enlarged.

If industry can carry these plans through, they will be a powerful support for general prosperity. In the past when industry's spending on new plants and equipment has been high, general business has prospered. When plant and equipment expenditures fell, all business declined.

But industry's plans depend largely on profits. Industry is getting about two-thirds of the funds it needs to finance improvements from profits. If Congress raises taxes on business sharply, while the return of competition also squeezes profits, industry may have to cut back its plant and equipment purchases.

•

The McGraw-Hill survey outlines what these plans of industry can mean to the country.

Capacity would be increased at least 13 per cent. Productivity—output per man-hour—would probably be increased more.

Companies plan to devote three-fourths of their funds to increasing efficiency by replacing and modernizing equipment. The result—a higher standard of living and added industrial strength to reinforce national security. And, in the process of making improvements, industry would contribute importantly to continuing prosperity. *But all this depends on what happens to taxes.*

The Truman program also shows how business is in the hands of Congress.

If Congress votes the appropriations the President requests, and passes all the new taxes he wants, the government will actually take in from taxes about $7 billion more than it spends in the year beginning June 30. Draining that much money out of business channels when industry is adjusting to buyers' markets and stiffer competition might well touch off a general set-back.

More likely, say Washington observers, is that Congress will appropriate more than the President recommends and give him less in the way of new taxes. If that happens, the government's cash intake and output would be much more nearly in balance and business would find the going much easier.

Congress, moreover, won't act on appropriations and new taxes until late in the spring—when it will have a chance to see how business is going. It, too, will consider government spending and income that is not included in the budget—and which is included in making the estimates above. For example, veterans will get a $2 billion insurance dividend this fall.

It is clear, though, that—with the postwar superboom easing off and with government, including federal, state, and local agencies taking one dollar in four of the national income—the course of business is geared directly to government action. *It will pay businessmen, more than it ever has since the war, to keep an eye on Washington.*

•

One thing to watch: Government's weight on business in the next few months. Tax collections up to March 15 will give U.S. about a $5-billion surplus for the first quarter. In 1947 and 1948 that first quarter surplus showed up in falling bank deposits and substantial dips in many sales curves.

This year the impact on many businesses may be heavier than it was last year—*particularly in those lines that have just run into buyers' markets.*

Manufacturing industries hit new peaks of peacetime activity last fall, have leveled off since. Production, as measured by the Federal Reserve Board Index, touched 195 in October, slipped to an estimated 191 in December. Average weekly wage reached $54.50 in October, dropped off one cent in November. Employment in manufacturing reached its postwar high in September—16.7 million. Wholesale prices of goods other than farm products and foods reached 153.3 per cent of the 1926 average in November, sloped off slightly at year's end. They were at about this level through the last four months of 1948.

With the stock market sparkling occasionally and retailers looking for good business in late winter and early spring, industry in general went into the New Year on an even keel.

Barring war (and the Russians have begun to talk "peace")—and with any break from Congress—manufacturers look for another year of high activity.

Conveyorized Packaging Line

PACKAGING SERVICE PARTS on a conveyor has replaced the old system of individual wrapping at General Motors Truck & Coach Division, Pontiac, Mich. A better job is now being done more easily and more efficiently. Improved working conditions are evidenced by elimination of grease, which formerly covered the hands and clothes of those doing the packaging.

The complete operation, including greasing, wrapping, and boxing, previously was performed at individual benches, each packager having a grease container and roll of heavy wrapping paper.

Six Steps

Bearings, connecting rods, and other service parts now come to the conveyor belt covered with light oil containing a rust inhibitor, and are placed on aluminum foil wrappers (1) at the head of the conveyor. On the way down the line, boxes are placed beside the parts (2), and they are wrapped (3). After being inserted in the boxes (4) and the lids closed (5), the packaged parts are placed in a shipping container (6).

Change-over to the new system was made only after exhaustive tests by company engineers. The aluminum foil and oil film were found to prevent corrosion for long periods.

OLD WAY. A lot of grease, wrapping paper, unpleasant to handle

NEW WAY. Parts come to the packing conveyor line covered with light oil, are wrapped tightly in aluminum foil. Now a clean, easy job

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

Calendar a Month for Training Follow-Up

Following up a supervisory training course, Esso Standard Oil Company, Elizabeth, N.J., distributed a calendar each month to its supervisory personnel.

Summarized on each calendar were some of the important ideas developed during sessions of the two-week, full-time, off-the-job training course for new supervisors. The calendars were an application of the belief that supervisory techniques and principles must be reemphasized constantly to remind supervisors to use them.

Department heads distributed the calendars in the plants. Each foreman received his calendar from his immediate superior. The calendars were designed to be folded and inserted in 3-ring binders and used as separators for material pertinent to the subject outlined.

Calendars were prepared on stiff paper and issued individually. Topics included: Passing on Know-how, Employees Are People, There Is a Better Way, Costs Under Control, and Proper Use of the Reprimand.

SMOKING DISPOSAL UNITS are located throughout the many plants of the Caterpillar Tractor Company, Peoria, Ill. Before, employees would stamp out cigarettes and cigars on the floor and either let them lie or toss them into some paper disposal basket. This habit made the plant look messy and often resulted in minor fires in the waste disposal units. Now, hundreds of these smoking disposal units are located throughout the plant. Housekeeping has been improved, and minor fires have been eliminated. The maintenance department is responsible for cleaning these disposal units daily and for locating them throughout the plant.

Samples "Sell" Company Product

F. G. PUTNAM, Personnel Manager, Micro Switch Division, First Industrial Corporation, Freeport, Ill.

Samples of the product are offered to visitors at Micro Switch Division, First Industrial Corporation, Freeport, Ill. These samples are "seconds," in good operating condition, but with some minor flaw that has caused the inspection department to classify them as not quite perfect.

That the visitors appreciate this opportunity to try out the product has been proved time and again. Many of them take a switch every time they visit the company, and they tell company men how they have used them. Management at Micro Switch feels that this idea has much merit in advertising and building good public relations.

Visitors who are taken on a tour of the plant get an additional welcome—signs placed on bulletin boards read: "We have with us today—Mr. John Jones, XYZ Corporation, New York."

Company Information and Fun at Lunchtime

DON BARRY, East Orange, N. J.

To get across company facts to employees, and at the same time provide a few minutes of relaxation and entertainment, General Aniline & Film Corporation, New York, has designed a new quiz game, called "Qunch," which is played in the plant cafeteria once each week.

To play Qunch, workers are given printed cards, which have four multiple-choice questions, and one containing five true or false statements. A check-mark in the right place is the answer. Company facts are sandwiched in with such questions as what team won the company bowling tournament.

After lunch the cards are torn on the perforated line, and the answers dropped into a box. The stub, with the number on it, is

held by the employee until the following week, when the scores and correct answers are announced.

To make the game interesting, free lunches for a week are awarded to the highest scorer, drawing lots in case of ties, and one free lunch to the holder of the lucky-number card in a prize drawing.

•

BEND THE KNEES AND NOT THE BACK—lift safely and with one-fourth the effort. That's the lesson taught by this mannequin devised by Al R. Beecroft, left, safety supervisor for all Food Machinery & Chemical Corporation plants. The demonstrating figure has a scale register, which records the equivalent of 5 pounds of lifting with the safe method compared with 20 pounds the unsafe way. So far Beecroft has used the figure only at the John Bean (Western) Division in San Jose, Calif., but he plans to build copies for use elsewhere in the country. He reports that no back injuries had been suffered by plant workers in a three-months period after the first safety demonstration using the model.

•

Movable Panel Holds Steel Sheets

Time-wasting packing of small orders of stainless steel sheets has been eliminated by the U. S. Steel Supply Company, warehousing subsidiary of the U. S. Steel Corporation in Los Angeles.

Delivery truck has a stationary panel built on the side, back of which is a movable panel. When a crank is turned, the space between the panels widens to accommodate one or a hundred sheets. As deliveries are made, the crank is reversed, keeping the remaining sheets standing upright, reducing the possibility of scratched or dented sheets.

Signal Board Expedites Materials Handling

FRANK W. EHMKE, Plant Maintenance Engineer, Snap-On Tools Corporation, Kenosha, Wisc.

A signal board, high in the center aisle for maximum visibility, proved to be the solution to the problem of expediting the movement of parts and materials at Snap-On Tools. The plant is subdivided into sixteen key areas. Switches, in each of these plant areas, control the lighting of 10-watt bulbs which flash designated numbers to call a materials handling truck to any particular area. The old system of colored lights proved ineffective and was replaced by this signal board. Over 6000 feet of wiring was eliminated by the change.

Storage Racks Keep Steel in Place

There's a place for everything, and everything is in place, as far as steel is concerned, at Chevrolet Motor Division, General Motors Corporation, Bay City, Mich.

All steel bars, rods, and tubes are received at the rear of the steel storage rack section. A railroad siding runs parallel to the racks, so that material is unloaded and placed in storage without the necessity of rehandling.

Even alignment of the bar ends is made possible by a movable wooden "bumper," which lines them up as they are inserted. Each section has rolling doors for protection. And a numerical index system is used to identify the various kinds of material in storage.

Company Gives Training To College Students

A special summer course to train college students for industrial leadership was conducted by the Stamford Division of The Yale & Towne Manufacturing Company. The course was started with 22 students, from 15 colleges and universities.

Seventeen students were graduated when the course was concluded. Twelve returned to finish their regular college courses, and five will continue with Yale & Towne.

•

Machine Gets Better Care When Only One Man Uses

J. JEROME REICH, Reich-Huntington Iron Works, Huntington, West Va.

Recently we wanted to use our flame-cutting machine, after it had been idle for several days. Then it was found that it had been dropped. Both the delay and the necessary repairs were costly. It was impossible, of course, to find out who had done the damage.

It was decided then and there that each month only one man would be allowed to operate this machine. At the end of the month the machine is carefully inspected and assigned to another man. The reason for rotating use of the machine in this way is to avoid having skill in its operation confined to only one man.

This simple idea is paying off so nicely in reduced repair bills that it is being extended to other kinds of equipment.

•

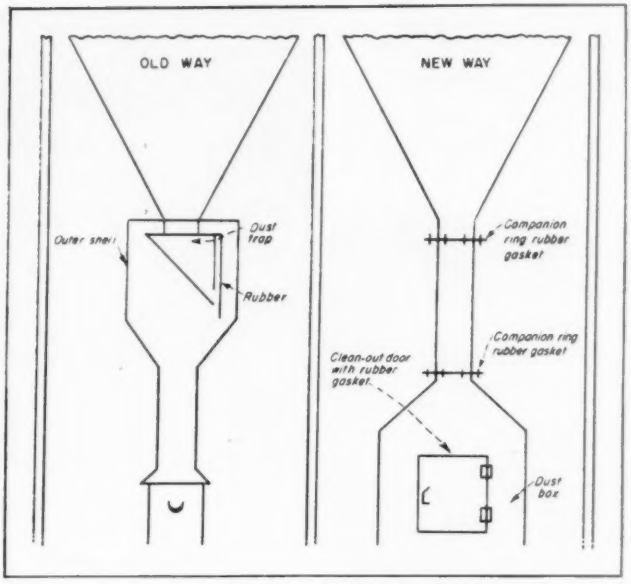
Decimal Rule Simplifies Finding Cubic Contents

DANIEL H. SPOFFORD, Assistant Factory Manager, The Wiremold Company, Hartford, Conn.

Before sending packing cases to foreign destinations, it is customary for the shipping clerk to determine the cubic contents. Previously he did this by using a 6-ft. rule to get the three dimensions in inches, multiplying them together, and dividing by 1728 to arrive at the cubic feet. Quite frequently the division by 1728 was done inaccurately, and it was a tedious job as well.

This piece of arithmetic was simplified by remarking the back of the standard 6-ft. rule to show each foot subdivided into decimal parts (10 divisions to each foot). The rule was painted white, with black markings.

Converted from inches to decimal parts of a foot, the shipping clerk's problem is reduced to fewer figures. For example, 2.4x3.8x4.2=38.3 cubic feet.



Dust Box Eliminates Dust Trap Troubles

Dust removers for servicing shot-blast operations occasionally become a real source of operating difficulty, and in some instances involve considerable problems in maintenance and repair.

Until recently, two dust removers located just outside the tank and plate shop at Allis-Chalmers, Milwaukee, had been giving considerable trouble in handling dust from the blaster. A trap in the throat of each unit proved to be the sore spot. These throats frequently became clogged. In damp weather this condition was aggravated by the dust packing tight and becoming caked to the metal. To free it called for a good deal of work and time. In many instances the encrusted material had to be hammered loose.

At the suggestion of the millwright foreman, the traps were removed and dust boxes were installed. A sheet metal tube, 4 feet long, held in place by two companion rings and connected at the lower end to a dust box, completed the change (see sketch).

The dust box with a clean-out door provided the means of collecting dust, and replaced the heavy bucket formerly used.

ROTATING PARTS BINS are used in subassembly department of Marchant Calculating Machines Company, Emeryville, Calif., where build-up is started on machine's actuators. Quota for completed assembly is one every 20 minutes. Trays at lower left are for storage of month's supply of parts. Leadman keeps workers' bins supplied.

YALE FORK LIFT WORK SAVER

YALE FORK LIFT TRUCK

Time Savers, Cost Cutters

Battery Electric Trucks and EXIDE-IRONCLAD BATTERIES

Handle materials the modern way . . . the fast, safe, economical way. Use versatile battery electric trucks for loading, unloading, hauling, high tiering. They'll help you speed production, open up bottlenecks, save and earn for you all along the line. When powered by dependable Exide-Ironclad Batteries, you can count on full shift availability day after day, year after year.

Different from all other batteries in construction as well as in performance, the Exide-Ironclad possesses ALL FOUR of the essential characteristics demanded of a battery for electric industrial truck service—(1) high power ability, (2) high efficiency, (3) great ruggedness, and (4) long life. These characteristics are due to the special construction of the Exide-Ironclad Battery, especially its rugged, tubular positive plate.

Write for further particulars and FREE copy of Exide-Ironclad Topics, which covers latest developments in materials handling and shows actual case histories.

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DEPENDABLE

POWER

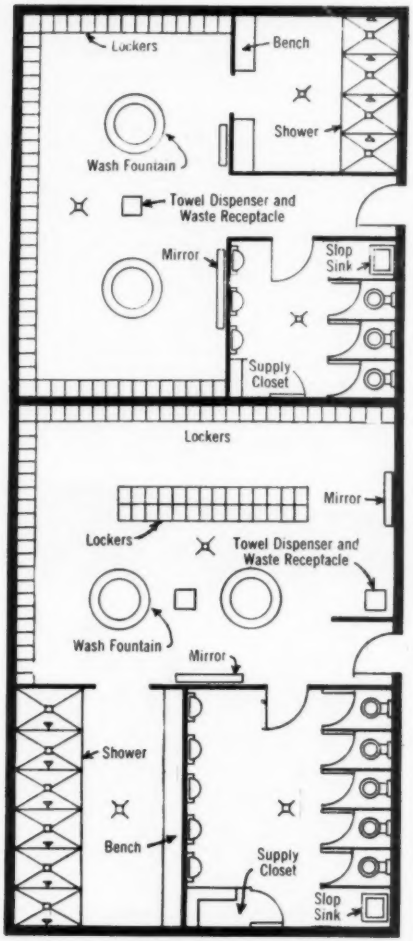
THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

management data sheet

38

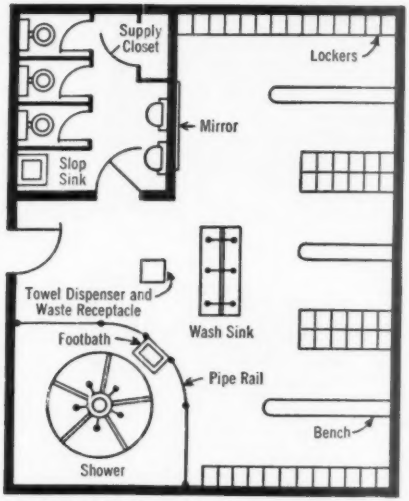
Plant Locker and Wash Rooms

PROPERLY PLANNED and equipped sanitary and recreational facilities for employees are conducive to high morale and high health standards. In this issue are floor plans for typical locker and wash rooms for large and small industrial plants. New facilities and improvements may be based on these guides.

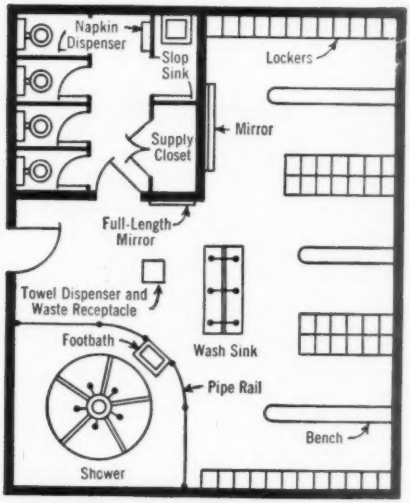


SMALL COMBINATION locker and wash rooms (70x30 feet) designed to provide individual rooms for different shifts and to separate groups due to the nature of their work.

Source: Washroom Advisory Service, Scott Paper Co., Chester, Pa.



COMBINATION wash, shower, and locker room (33x26 feet) for 50 men. Offers high efficiency and low maintenance cost. Pipe rail assures use of footbath



SAME COMBINATION (33x26 feet) with modifications will accommodate 50 women. All facilities are arranged for correct traffic flow. Large supply closet is provided

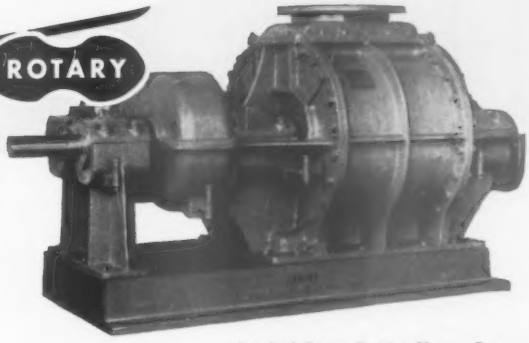
CONTINUED ON PAGE 138

CENTRIFUGAL

R-C dual-ability plays no favorites!

Battery of five R-C multi-stage Centrifugal Gas Exhausters driven by steam turbines.

ROTARY



Standard Rotary Positive Blower, Type RCD, built in 8" to 22" gear diameters.

With a wide choice of Centrifugal and Rotary Positive Blowers available, you can usually select standard R-C units to meet your specific applications. Capacities range from 10 CFM to 50,000 CFM or higher for special requirements. Roots-Connersville is the only blower manufacturer offering you this *dual choice.*

We're impartial as to drives, too. We supply them or you can utilize drives already available. Direct motor, speed changer or V-belt, steam turbine, gas engine or other modern types provide high-efficiency operation for R-C units. That's another phase of R C *dual-ability.*

With R-C equipment on the job, you'll enjoy long-time, trouble-free performance. That's because of sound design and sturdy construction, based on 95 years of building gas and air handling equipment, *exclusively.* For any such problem, you are free to consult R-C *dual-ability.*

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BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

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Roots-Connersville builds the most extensive line of gas or air-handling equipment.

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•

Rotary Liquid and Vacuum Pumps

•

Positive Displacement Meters

•

Inert Gas Generators

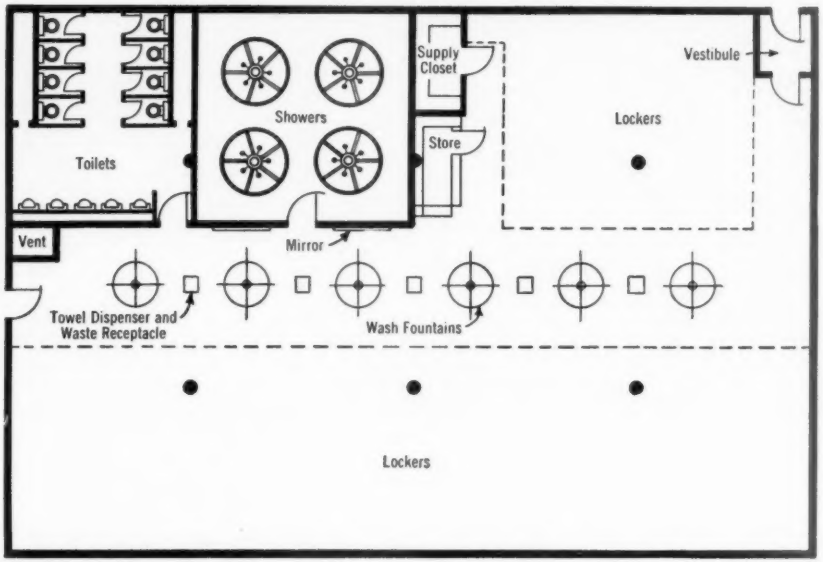
•

Send for descriptive bulletins or write us details of your specific requirements.

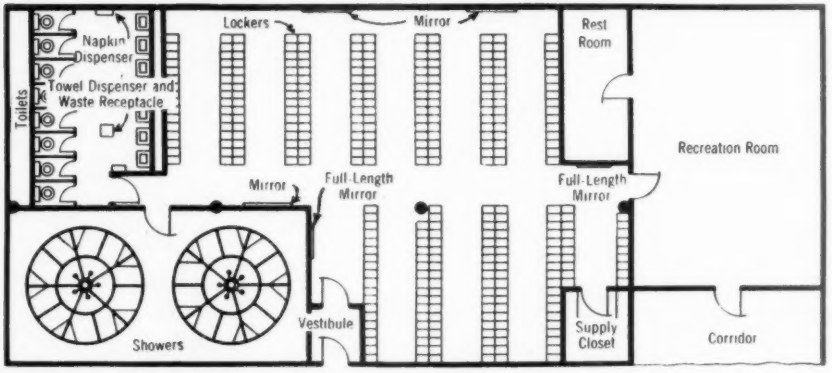
management data sheet 39

Plant Locker and Wash Rooms

CONTINUED FROM PAGE 136



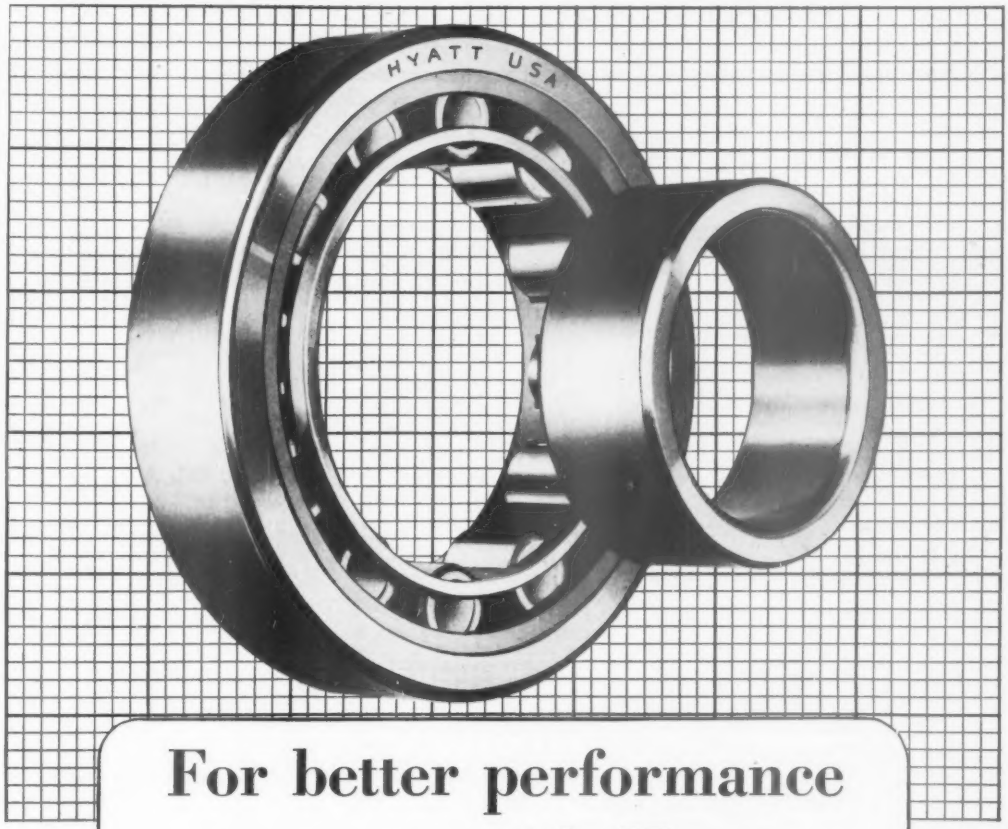
LARGE-PLANT wash, shower, and locker room (70x30 feet) for 900 men working in shifts. Small auxiliary toilet and washing facilities should be provided at strategic locations in production areas. Lockers may be installed according to needs



WOMEN'S COMBINATION for large plant (105x48 feet) is designed for approximately 300 women working in shifts. Restroom should include cots. Recreation room may serve as lounge-smoking room. Dispensers near mirrors supply roll tissue for lipstick dabs. Include several large mirrors with shelves nearby to hold personal items

The March issue will contain Data Sheets showing plans for smoking facilities, a recreation and game room, and a lounge. These plans have been designed for efficiency and low maintenance costs.

Source: Washroom Advisory Service, Scott Paper Co., Chester, Pa.



For better performance team up with Hyatts

HYATT is now in its fifty-seventh year of producing fine roller bearings for a very diversified list of machines and equipment.

Many manufacturers have for more than half a century consistently used Hyatt Roller Bearings year after year for the simple reason that by teaming up with Hyatts better performance was delivered to the user.

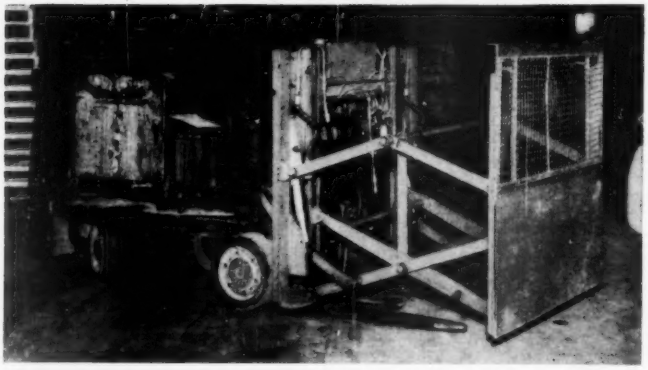
In almost every field—automotive—agricultural—steel—petroleum—textile—construction and transportation Hyatts do the job they were designed to do—more economically and with a minimum of maintenance.

Hyatts' wide range of types and sizes meets every application requirement. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

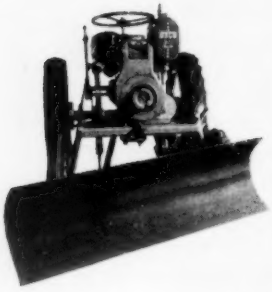
WHAT'S NEW IN EQUIPMENT

Briefed here—for the convenience of plant operating men—are descriptions of industrial plant equipment newly placed on the market



Pallet Unloader

Adaptable to all makes of fork trucks, pallet unloader is constructed with a self-contained hydraulic pumping unit built into the frame. However, if the truck on which device is to be used already has a hydraulic system installed, this may be removed. Unit may be used to unload from a pallet or directly from the truck forks. If a pallet is not to be used, it can be supplied without the gripping mechanism. Manufacturer states that the whole unit, or part, can be installed in a short time by any average mechanic. Two hydraulic cylinders thrust onto a link mechanism which extends the platen 42 inches, on the large type, with uniform motion in 15 seconds. Retraction is said to take place in 10 seconds, and a cushioning device absorbs the shock at the end of this movement. The pallet gripping operation is synchronized with the platen so that the whole sequence of operation is automatic and controlled by a single electric switch or pilot-operated valve. Feature of the pallet gripping mechanism is said to be that regardless of the position of the pallet, the mechanism adjusts itself to the pallet before the gripping jaws come into operation, making it possible to move fragile packages and loads without damage. The amount of fork space taken up is 4½ inches. Hauser Machine Co., Box 7116, Sylvania Station, Fort Worth, Tex.



Tractor With Snow-Plow Attachment

General purpose tractor, called the Osco-65, is available with a reversible-angle snow-plow attachment. The tractor itself features individual wheel brakes, and automatic clutch with foot throttle control. It may also be used for general maintenance work, hauling, bulldozing, grass cutting, and other operations. Osco Motors Corp., 2020 East Orleans St., Philadelphia 34.

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Steam Boilers

Operating on 220-volt single-phase power, 1½-hp. boilers are available in three pressure ranges: Series No. 512, 100 p.s.i.g.; No. 612, 200 p.s.i.g.; and No. 712, 250 p.s.i.g. Units measure 14 inches wide, 21 inches long, 35 inches high, and are said to generate 45 pounds of steam per hour. Applications include plastics molding, heating of rubber rolls, glue pots, laboratory presses, autoclaves, and other operations where precise regulation of critical processing temperatures is required. Units are portable, weighing less than 100 pounds. Heat is generated by the resistance of the boiler water to the flow of current between solid metal electrodes, and manufacturer states that if there is no water in the boiler, no current flows, power input stops. Livingstone Engineering Co., 100 Grove St., Worcester 5, Mass.

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Coolant, Oil, Air Applicator

For small machines, such as drill presses, milling machines, and other equipment used on both dry and wet operations, unit, called Localube, is designed to control flow of coolant, air, and oil. It may be attached by means of three machine screws wherever it is necessary to direct coolant, oil, or air to the desired point. The tip end of the device has a 3-in. long, ¼-in. copper tube which can be bent when necessary. Flexible joint is said to compensate for wear and provide good seating facilities. Joint is adjustable at approximately 90 degrees in any position, according to the manufacturer, who states that it is attached to ½-in. bent tubing which permits the unit to be mounted on the outside of the machine, with the bend bringing the tip to the proper location. Manufacturer states that by using two units, a combination of air and oil can be used for lubrication of punches and dies by atomizing the oil with the air. Fostoria Pressed Steel Corp., Fostoria, O.

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Portable Sprayer

Pistol-grip trigger-control portable sprayer, called the Payswell, is suitable for small maintenance work. It is self-contained, and operates with a built-in compressor, eliminating the

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need for hose or separate motor. Unit weighs four pounds, and includes an unbreakable quart container as part of the unit. The enclosed motor operates from any 110-volt electrical outlet, a.c. or d.c., at a speed of 10,000 r.p.m., producing over 50 pounds pressure. Interchangeable nozzles provide a spray pattern of either cone or fan shape. The die-cast parts are accessible for cleaning, and a heavy-duty 9-ft. cord is included. Unit handles deodorants, disinfectants, paints, and other sprayable liquids. Sellco Corp., 815 Andrus Bldg., Minneapolis 2.

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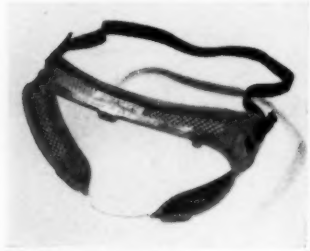

Safety Goggles

For eye protection in woodworking, grinding, spot welding, and similar light-duty operations, two plastic goggles, called MonoGoggles, are made of a one-piece plastic lens. Features which are said to contribute to comfort when worn on all-day jobs are light weight, good impact resistance, and low heat transmission of the lens, said to retard fogging. Both flat and curved lenses are available, so that those who wear prescription glasses may select the style most comfortable. Lenses are available in either clear or green acetate, and are replaceable. Frames are available in clear acetate, and in mottled brown Polythene, said to retain its flexibility under extremes of temperature. Willson Products, Inc., Reading, Pa.

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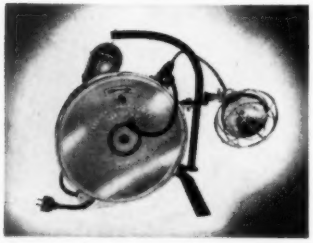

Portable Flood Lamp

Two free-running reels on portable flood lamp permit it to be used at distances up to 52 feet from the nearest electric outlet. Called The Light-King, it is equipped with an extendable trouble or utility light and a 3-point standard to provide stability. Manufacturer states that leads are always out of the way as they are fed from the base of the reels, near the floor. Unit may be removed from the standard and mounted on wall or other location, and hook on top of the extension light allows it to be placed where most needed. Spotlight uses a 150-watt flood lamp; trouble light holder takes bulbs up to 100 watts. Designed for use on 110/120 volts, a.c. or d.c. Weight is 24 pounds; over-all height, 17¼ inches; width of standard, 12¼ inches, reels, 2¼ inches. Double outlet permits use of electric drill or other power tool by disconnecting either flood lamp or trouble light. The Keller Laboratories, Oneida, N. Y.

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Check Valves

Cone check valves are designed to provide for uniform, low-pressure drop over a wide range of flow rates, states the manufacturer, who says that they qualify under Army-Navy aircraft specifications requiring life tests of 50,000 cycles involving peak impulse pressures 150 per cent of rating, after which leakage is less than one drop per hour. Valves are available with anodized aluminum bodies and stainless steel poppets for pressures up to 1500 p.s.i., or with cadmium-plated steel bodies and heat-treated steel poppets for 3000 p.s.i. service. Ports are male or female threaded in ⅛- to ¾-in. pipe size, or for tube sizes ¼- through 1-in. O.D. Tube connection ends have a 37-deg. flare angle. All types are said to function in a temperature range of −65 degrees. F. to +160 degrees F., and open under 4-6 pounds directional pressure. Arrows stamped on the valve body indicate direction of flow. The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12.

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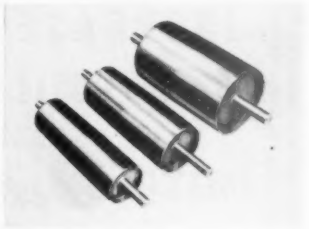

Wide-Face Conveyor Pulleys

Welded steel pulleys, designed specifically for conveyor use, are available in lengths up to 10 feet and in diameters ranging from four to six inches. They can be supplied with either crown face or straight face, and either with hubs or welded to the shaft, as shown in the illustration. Samuel Olson Mfg. Co., Inc., Dept. N, 2418 Bloomingdale Ave., Chicago 47.

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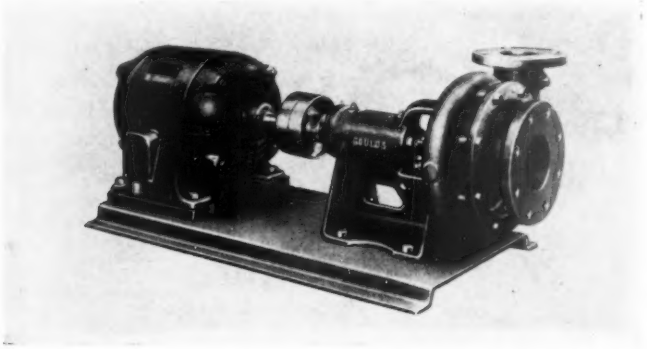
Oil Clarifier

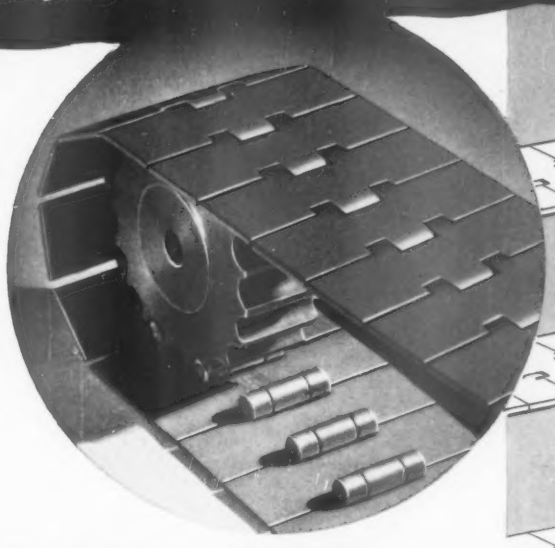
System designed for purifying, dehydrating, and degasifying insulating oil comprises dual Cranite purifiers, pumps, and motors; a vacuum dehydration and degasification unit with high and low pressure pumps; central operation panel board for all controls; interconnecting piping; valves; and accessories. All units are mounted on a floor truck or skid for portable use. Called the Houdaille Purivac unit, device is designed for two-stage operation; the first, for purification of the oil to remove oxidation products and foreign contaminants; the second, for dehydrat-



Pumps

Centrifugal pumps, for water supply, air conditioning, and similar uses, are available in 14 sizes, for both motor and belt drives. They are equipped with motors ranging from ¾ to 50 horsepower, and have capacities from 10 to 1800 g.p.m. with heads to 120 feet. Casing is of the volute type, bolted to support head, with recessed lock fit. Discharge nozzle can be swiveled to any one of four positions. Tapped openings provide for priming, venting, and draining. Screwed suction and discharge connections are provided on all pumps up to 30-in. suction and 2½-in. discharge types; flange connections are provided for the larger sizes. Goulds Pumps, Inc., Seneca Falls, N. Y.

For Conveying Small Containers, Packages and Parts . .



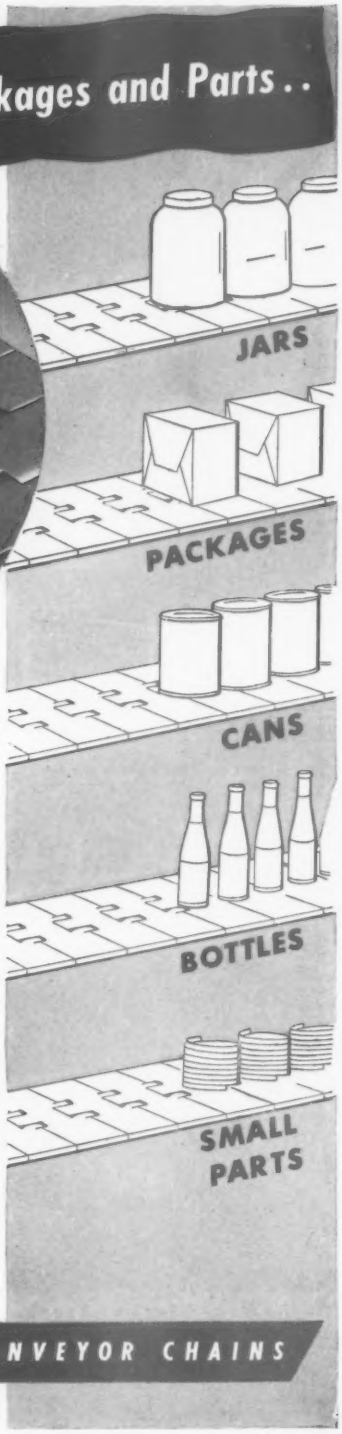


TABLE TOP IS TOPS!

Small parts and packages . . . bottles, cans and jars, Rex Table Top offers the most efficient, economical and convenient method of materials handling.

Available in both stainless and case-hardened steel, Table Top is a natural for moving small parts through heat-treatment ovens and other processing steps. Its continuous carrying surface, provided by the exclusive interlocking hinged joint construction, assures smooth, steady, tip-free conveying for bottles and jars. There's no expensive breakage and spillage with Table Top on the job.

Rex Table Top Conveyor Chain is simplicity itself. A one-piece platform link and a pin are the only parts. There are no attachments to loosen or "wobble" . . . no pockets to catch and hold foreign material. Sprocket tooth bearing pressure is spread over the entire length of the joint . . . giving unusually wide bearing area. Pin is relieved of all load when flexing because each sprocket tooth contacts both leading and following links simultaneously. Table Top just has to last longer.

For all the facts, send for your copy of Bulletin No. 47-15. Chain Belt Company, 1667 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

. . . DRIVE AND CONVEYOR CHAINS

ing and degasifying the purified oil. The use of two purifiers with a separate pump and motor permits operating them either singly or in parallel, so that a refill change can be made on one while the other unit is in operation, according to the manufacturer. Honan-Crane Corp., 702 Wabash Ave., Lebanon, Ind.

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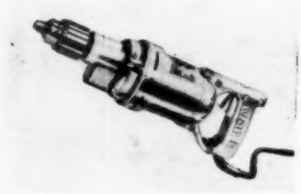

Electric Drill

Heavy-duty portable electric drill, NW3C, has a $\frac{3}{8}$-in. steel drilling capacity, $\frac{5}{8}$-in. wood. Spindle speed running light is 750 r.p.m.; on full load, 450 r.p.m. Accessories include a bench drill stand and a bench clamp stand; for plastics polishing, a set of polishing accessories. Fred L. Stuart, 33 West 42nd St., New York 18.

•

Remotely Controlled Hoist

Controlled by an electronic device called the Omni-Lectronic Control, hoist may be operated over the water from warehouse to ship, across expansive plant areas, over high-temperature equipment, and along rails extending over plant yards without the use of long electric control cables. An electronic transmitter, plugged into plant power lines, supplies energy to operate the hoist. A receiver mounted on the hoist and connected to hoist contactors directs operation. For hoist control, there are five dynatron tubes, or, if desired, other type of audio frequency generators, each of which generates one audio control frequency to cause operation of one particular motion of the hoist. Where a number of hoists are to be operated from a given location and from a single power supply, it is possible to control each hoist independently, according to the manufacturer. The hoist is manufactured by Yale & Towne Mfg. Co., Philadelphia; the control by Omnicon Corp., 2 Broadway, New York 4.

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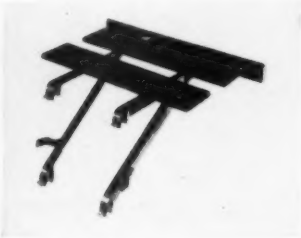

Ladder Stage

Designed for use with an ordinary extension ladder, and weighing less than nine pounds, portable "Safety" ladder stage affords a working area of 26x24 inches. Its frame is structural aluminum alloy, footboards are of seasoned waterproof wood, slotted for width adjustment. Juniata Co., Park Bldg., Pittsburgh 22.

•

Liquid Belt Dressing

Double-duty liquid belt dressing is said to eliminate belt slippage where oil or grease are present on pulleys, and to exert a positive action in keeping belts on pulleys and in taking up slack. Manufacturer states that it also serves as a gasket cement during assembly, and that it remains flexible throughout its life. Available in 4- and 8-oz. bottles with wide mouths and dauber caps, in quart, gallon, and 5-gal. containers, and in 55-gal. drums. Porter Mfg. & Supply Co., 2500 West 6th St., Los Angeles 5.

Tilting-Type Stacking Truck

Light-weight battery-operated hand truck is available in single lift (SCL) and in telescopic (SCLT) models. Both units are provided with hydraulic lift motor and pump. Backward tilt is 21 degrees, forward tilt, five. The single-lift unit has an over-all height of 79 inches; width, 32½ inches. Equipped with a standard 11-plate battery, it weighs 3400 pounds. The telescopic model weighs 4000 pounds, is 83 inches high, and 42½ inches wide. Its lift is 120 inches. Automatic Transportation Co., 149 West 87th St., Chicago.

Impact Wrench

Trademarked "Packy," $\frac{3}{8}$-in. universal electric impact wrench may be used for driving nuts, bolts, cap screws up to $\frac{3}{8}$-in. thread size; studs up to ½-in. thread size; removing broken studs, using extractor; driving and removing machine screws to $\frac{3}{8}$-in. thread size, wood screws up to No. 20; drilling holes in steel to ¼ inch; step drilling or reaming holes from ¼ to ½ inch in $\frac{1}{8}$-in. steps. It may also be used for boring up to 29/32-in. holes in wood; tapping up to ½-in. thread size; driving holesaws up to 1½-in. diameter through metal; driving rotary files; and performing various other operations. The wrench, weighing 6 pounds, 14 ounces, has a free speed, forward or reverse, of 2150 r.p.m., strikes 2000 blows per minute, and employs a ½-in. square spindle drive with a 1 7/16-in. spindle offset. Independent Pneumatic Tool Co., 175 State St., Aurora, Ill.

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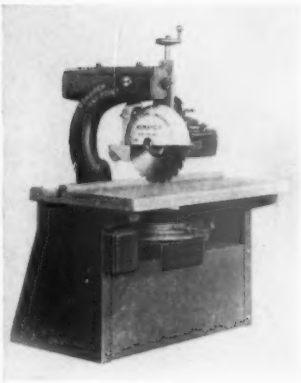

Radial Saw

Designated as Uni-Point Model X36AF, radial saw can be raised and lowered, and miter angles can be adjusted easily, according to its maker. It is protected against entrance of sawdust in the telescoping ram. Wipers at the front and back of the ladder roller bearings keep the track clear of dust. Ripping gage on the telescoping ram is designed for easy readability, and fitted with an adjustable pointer to permit accuracy in setting up work and in cutting. Manufacturer states that adjustment can be made for various gage saws, or to compensate for saws with different kerf. An automatic spring pin finder locates and locks the motor in various positions for cross cutting, ripping, ploughing, boring, dadoing, and similar horizontal cutting positions. Vertical motor positions for shaping, notching, jointing, and routing can also be located, and the motor locked in place by this device. American Saw Mill Machinery Co., Hackettstown, N. J.

•

Fire-Resistant Paint

Applied like ordinary paint, with brush or spray, fire-resistant compound, called F.R.P., is said to re-

GEARED

for power mo ernization

Improved

STERLING

SLO-SPEED

BALANCED DESIGN FOR EVERY HORSEPOWER RATING

Sterling is as well known for its precision gears as for the advanced engineering in its electric motors. From power intake to drive shaft, Sterling makes motors, gears, and all parts in one modern plant—giving you a highly efficient, close-speed power unit for the "one low" current production speed. Thousands of satisfied users are increasing plant profits with Sterling Enclosed geared motors.

Send for new Information Bulletin.

UNDIVIDED RESPONSIBILITY . . . Experienced engineering — precision helical gears — liberal ball bearings — splash lubrication — and rugged construction are combined in this one compact, sturdy, dependable unit.

Improved Sterling Slo-Speed geared motors are available with single and double reduction gears in a wide variety of ratios.

Use the improved Sterling Speed-Trol—where "speed control" — faster or slower — is required.

Where constant normal speed is required, use the Improved Sterling KLOSD; KLOSD-TITE FAN COOLED; KLOSD-TITE ENCLOSED; KLOSD - FACE - MOUNTED electric power drives.

STERLING ELECTRIC MOTORS

GENERAL OFFICES: LOS ANGELES 22, CALIFORNIA

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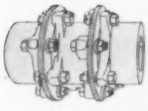
THOMAS
Flexible ALL METAL
COUPLINGS

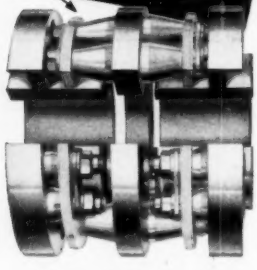
Engineered to stand up on the toughest jobs, Thomas Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special couplings.



BACKLASH FRICTION WEAR and CROSS-PULL are eliminated NO LUBRICATION REQUIRED!

PATENTED FLEXIBLE DISCS



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

Write for New Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

duce fire hazards when used on woodwork or on wood products. Manufacturer states that one coat is sufficient, and one gallon will cover approximately 500 square feet. An oil-base paint, it is available in exterior, interior gloss, or interior flat, and may be colored with oil tints. F.R.P. Corp., 1018-1024 South Wabash Ave., Chicago 5.

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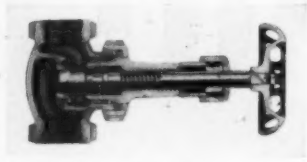

Plug-Type Bronze Globe Valve

Suitable for use under severe service conditions, such as pressure regulation, steam control by-pass lines, temperature regulation, apparatus throttling, bleeds, continuous blow downs, or other close regulation of steam, plug-type bronze globe valve is designed for 300-lb. service. It features an "Armor Seat" and a slip-on plug with a T-slot for engaging spindle head. Plug and seat ring are made of alloy stainless steel, heat treated to give hardness as well as ductility, according to its maker. Available in sizes from ¼ to 2 inches. Jenkins Bros., 80 White St., New York.

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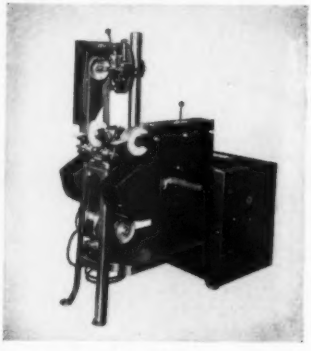


Grinder, Polisher

Using coated abrasive belts instead of wheels, H-type grinding, polishing, and deburring machine is available in four different models. Two different quality grit belts may be used to speed up work on small parts that require more than one finishing operation. In addition, the unit can be converted into a buffing machine. All four basic models consist of an arbor head, an idler unit, a straight-faced contact roll, and abrasive belts. The ⅝-in. arbor shaft extends 3½ inches out from the inner flange at each end, and has a 2½-in. acme thread at the ends to take contact rolls from ⅞ to 2⅞ inches. Two drive belts can be run through bottom of arbor head for use on welded steel stand, or through the back of the arbor head for use on other benches. Aluminum oxide belts in four different grits are available, for use on steel, brass, forgings, die castings, and some plastic materials. Silicon carbide belts may be used on hard materials of low tensile strength. Delta Mfg. Div., Rockwell Mfg. Co., 600 East Vienna Ave., Milwaukee 1.

•

Magnesium Ladders

Line of magnesium ladders includes step ladders of all types, platform and warehouse ladders, and light- and heavy-duty extension ladders. Fabricated from a new alloy said to combine rigidity, strength, corrosion resistance, and good wearing qualities, these ladders are reported to be as light and sometimes lighter than similar aluminum ladders. The Aluminum Ladder Co., Worthington, Pa.

•

Light-Weight Lift Truck

Small electric power truck, for maneuvering and tiering loads, weighs 4550 pounds, including battery, and is said to handle loads up to 2000 pounds. Length over-all with 30-in. fork is 96 inches; width, 32½ inches. Straight-line steering mechanism is said to enable it to turn in 60-in. intersecting aisles and in 109-in. right-angle aisles. A low center of gravity contributes to safe handling. Straight travel speed with full load is 5¼ m.p.h. Maximum height of lift of fork is 121½ inches. Lifting speed loaded is at a rate of 28 f.p.m.; lowering load rate, 45 f.p.m. Safety valves control lifting and lowering. Form-fitting, air-foam cushion with back rest is provided for operator comfort. Elwell-Parker Electric Co., Cleveland.

•

Automatic Floating Battery Charger

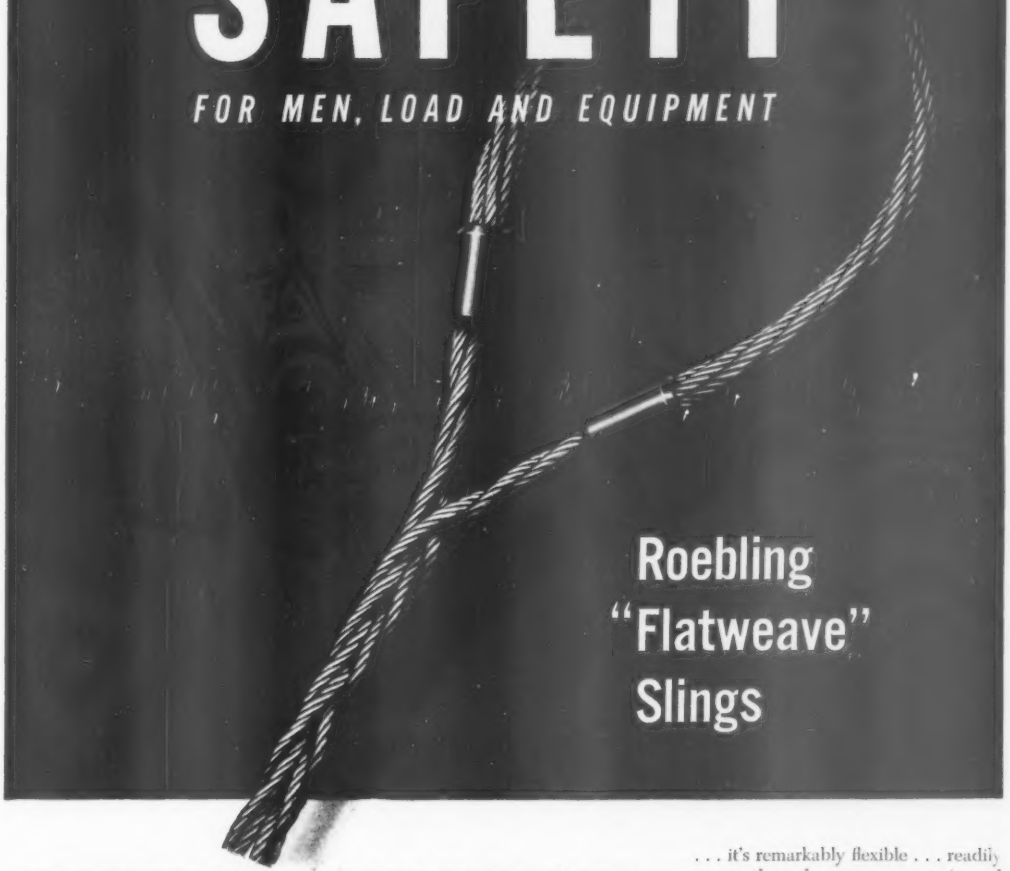
Line of electronically controlled and regulated floating battery chargers is suitable for power stations, communication, and other applications requiring accurate control of floating voltage. Similar equipment utilizing magnetic controls has also been developed. Standard chargers are said to be automatic in operation, to have constant potential output, and to maintain floating charge on

JR ROEBLING

UTMOST

SAFETY

FOR MEN, LOAD AND EQUIPMENT



Roebling "Flatweave" Slings

"FLATWEAVE" SLINGS . . . A FULL RANGE OF SIZES

FOR MOST HOISTING JOBS, you'll find that Roebling "Flatweave" Slings are tops for safety and economy. Roebling is an old hand at making slings, and this modern "Flatweave" construction has been specially developed for new and extra efficiency in handling loads of almost every type.

Six individual wire ropes are woven together side by side in "Flatweave" Slings. This forms a broad, flat bearing surface and prolongs the life of the sling. Important, too, "Flatweave" is very easy to handle . . . resists kinking . . . it's remarkably flexible . . . readily passes through narrow spaces in and under loads.

Write for your free copy of the "Roebling Sling Data Book!" It tells everything you ought to know about slings and sling accessories . . . will help you handle loads with top speed and safety. John A. Roebling's Sons Company, Trenton 2, New Jersey.

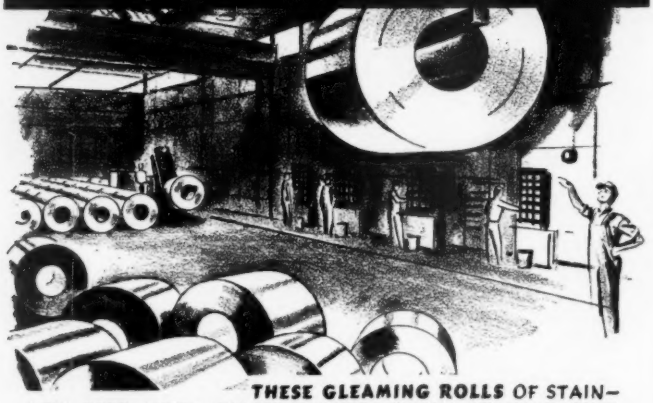
WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Rd. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 1635 17th St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. 12th St. ★ *Pittsburgh*, 855 W. North Ave. ★ *Portland, Ore.*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 17th St. ★ *Seattle*, 900 First Ave.

ROEBLING

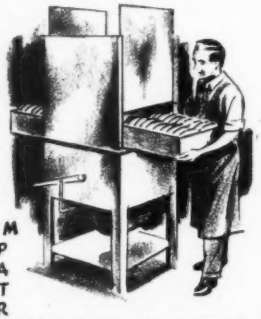
☆ A CENTURY OF CONFIDENCE ☆

A Shining Example of JEWEL POLISHING!



THESE GLEAMING ROLLS OF STAINLESS STEEL WERE POLISHED WITH ESPECIALLY DEVELOPED JEWEL SILICON CARBIDE PAPER BELTS . . . BELTS THAT CUT FASTER, LAST LONGER, BECAUSE THE ABRASIVE IS CEMENTED TO A STRONG PAPER BACKING WITH BONDITE . . . A POWERFUL, HEAT RESISTING ADHESIVE. AND THESE BELTS HAVE THE EXCLUSIVE, SMOOTH-RUNNING VELVET JOINT THAT WILL NOT JUMP OR SCRATCH THE FINISH. SO IF YOUR PRODUCTION IS BOGGED DOWN IN THE POLISHING STAGE, TRY JEWEL ABRASIVE BELTS FOR STAINLESS STEEL.

IN PRODUCT ASSEMBLY JEWEL ABRASIVES ARE USED TO FINISH THESE EFFICIENT AUTOMATIC DISHWASHERS. AFTER WELDING, THE CORNERS AND EDGES OF THE STAINLESS STEEL CABINETS ARE POLISHED WITH NO. 80 JEWELOX CLOTH X73. THE MANUFACTURER REPORTS, "THIS CLOTH IS THE BEST WE'VE EVER USED."



AND HERE'S A 3-WAY PROBLEM LICKED BY AP ENGINEERS. A PROMINENT MANUFACTURER OF CUTLERY WANTED AN ABRASIVE THAT COULD BE USED TO FINISH CARVING KNIVES WITH STAINLESS STEEL BLADES, COCOBOLO WOOD HANDLES, AND BRASS RIVETS. JEWEL SILVER STREAK CLOTH BELTS, GRIT NO. 80, OUTPERFORMED ALL OTHER ABRASIVES IN CUTTING THIS UNUSUAL COMBINATION OF MATERIALS.

SO REMEMBER JEWEL WHEN YOU ORDER COATED ABRASIVES. THERE'S A JEWEL PRODUCT FOR EVERY POLISHING AND GRINDING NEED. AND PROPERLY USED JEWEL ABRASIVES WILL SPEED YOUR WORK, CUT YOUR COSTS!

Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS · MAKERS OF JEWEL COATED ABRASIVES

the battery group to within ±1 per cent. Manufacturer states that water needs to be added only about twice a year.

Equipment is said to operate over a relatively wide range of output voltages, permitting its use on many different cell combinations. Regulation is said to be accurate over the entire range, and to be independent of a.c. line voltage and frequency fluctuations.

Electronic overload protection automatically limits the current to the pre-set maximum value, preventing overloading of the charger by reduction of the terminal voltage below the battery voltage, and permitting the battery to carry the load until the peak requirement has passed. The battery is then automatically recharged and floated until the next power demand is received, according to the manufacturer. Power Equipment Co., Detroit 2.

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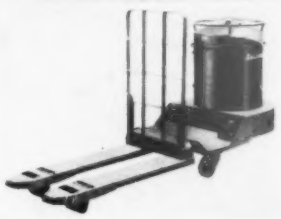

Pallet Truck

Power truck, called Palletruk, is equipped with two 9-in. forks, 48 inches long, spaced 9 inches apart, with tapered forward ends. A 4-in. lift is provided for floor clearance, and the truck is articulated to permit handling pallet loads over sharply pitched irregularities in floor levels without danger to load stability. Truck can negotiate in aisles slightly wider than the pallets being handled and turned in its own length, according to the manufacturer. Powered by an air-cooled Wisconsin engine, it handles loads up to 4000 pounds, even on a 15-deg. ramp. Fully rotatable turret power unit is said to provide complete maneuverability and constant truck motion without necessity for gear shifting. Salsbury Corp., 1161 East Florence Ave., Los Angeles.

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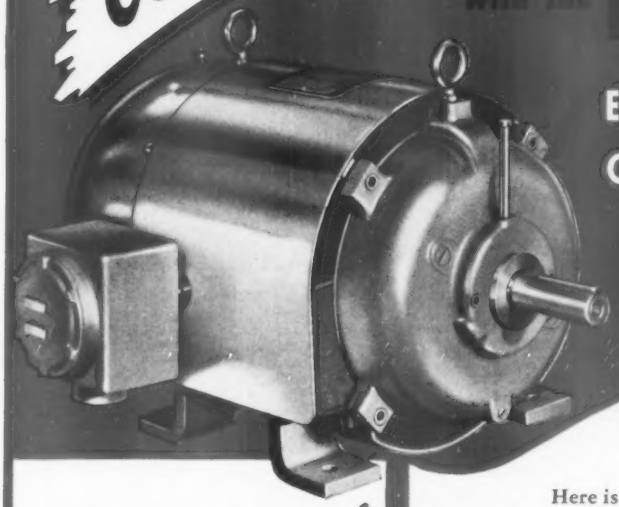
Floor Mat

Sponge-like mat, made of Neoprene blown into tiny sealed-in nitrogen balloons, provides a cushioning effect, according to its manufacturer. Triangular raised "feet" on both sides of the mat, called the Neo Sponge

COMPLETE INSURANCE

with the RELIANCE

EXPLOSION-PROOF and CORROSION-RESISTING MOTOR



Selected Materials and Design Features

OFFER MAXIMUM PROTECTION!

FOR CORROSIVE ATMOSPHERES

The Totally-Enclosed Fan Cooled A-c. Motor for Applications where Chemical Atmospheres Prevail

and

FOR ATMOSPHERES CONTAINING HAZARDOUS GAS OR INFLAMMABLE LIQUIDS

Underwriters' Class 1, Group D Explosion-Proof A-C. Motor

Here is the result of Reliance engineering applied to the problem of protecting motors that operate in either corrosive or explosive atmospheres. Frame and fan covers, fan, conduit box and end brackets are all made of selected corrosion-resisting materials. In addition, many extra steps are taken to achieve maximum protection, such as coating screws, counterboring screw holes and fitting-up with special compounds.

Reliance *Precision-Built* Motors offer you the *right* motor for any application. For further information about this explosion-proof, corrosion-resisting motor, write for Bulletin C-130.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

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General ★★★★★ *Product Protection*

Helps keep your customers satisfied
...Helps keep your customers!

No dents—No chips—No scratches
. . . and No costly complaints!

Porcelain enameled products, highly finished wood products . . . products of all kinds get positive protection—inside and outside—when packed in General Engineered Shipping Containers. And, here's why:

General Boxes are laboratory-designed *to the specific product.* This means that they are also lightweight, compact, and extra strong. They are easy to assemble quickly—frequently right on your production line.

Our engineers will be glad to help cut your packing and shipping costs. Write for facts today. Also send for *your* copy of THE GENERAL BOX.

Our two Designing and Testing Laboratories are available for the improved packing of your products. They are equipped with the most modern testing apparatus and staffed by experts with many years of experience in designing more efficient shipping containers.

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. . . engineered shipping containers

GENERAL OFFICES: **504 N. Dearborn St., Chicago 10.**
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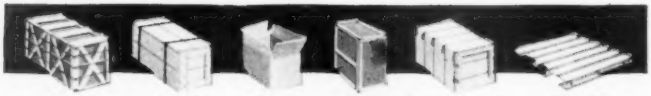
Continental Box Company, Inc.: Houston, Dallas.



Comfort Mat, are said to provide non-slip foot traction, and make the mat reversible. Matting is non-absorbent, resistant to deterioration by greases, fats, oils, heat, or acids, and is said to act as an insulator, both thermally and electrically. Available in standard widths of 18 and 36 inches, with lengths up to 96 inches and thicknesses of ¼ and ⅜ inches. American Floor Products Co., 1526 "M" St., Washington 5, D. C.

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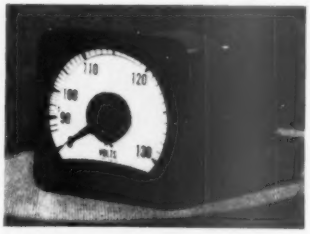

Voltmeter

Indicating voltmeter, designed for general switchboard use, has a scale 7.1 inches long, spanning 250 degrees about the center. The scale is expanded over the most frequently used range, from 90 to 130 volts, enabling easy detection and measurement of 0.5-volt variations within that range, according to manufacturer. Accuracy is claimed to be within ±½ per cent in the range of 105 to 125 volts, and ±1 per cent over the entire expanded range. Although available in only one rating, 0-90 to 130 volts, it can be supplied with scales applicable to potential transformers for voltages higher than rated. Meter is housed in a dust-proof, liquid-resistant case, 4¼ x4¼x6⅜ inches over-all.

Features include spring-mounted jewel pivots, anti-parallax scale, high overload characteristics, nonglare glass, shielding from stray fields, and stable performance under conditions of varying ambient temperature. The standard scale has a white background with black markings, but a black scale with white markings can also be furnished. General Electric Co., Meter & Instrument Divisions, Schenectady 5, N. Y.

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Floor Truck

Adjustable for various uses with available accessories, Load Carrier, Jr., floor truck is 30 inches wide with a 60-in. length of loading space between end racks; 63⅝ inches over-all length. It has a maximum capacity of 2500 pounds distributed load.

Snap-on Bench Grinders

with the famous Blue-Point Trade Mark

. . . have the construction features for smooth, powerful operation . . .

COMPLETELY ENCLOSED MOTOR: Super-powered, precision-balanced motors enclosed to prevent dirt, grit, etc. from entering.

BALL BEARING CONSTRUCTION: Oversize, grease sealed ball bearings used throughout, assure smooth motor operation.

LARGE RUGGED BASE: Rubber feet provide solid mounting free from vibration. Recessed bolt openings for permanent mounting.

INDUCTION RUN MOTOR: Develops less heat in the windings — more desirable for continuous operation.

STURDY TOOL RESTS: Adjustable for any type of work with ample take-up for wheel wear.

LARGE WHEEL GUARDS: Allow use of special shape grinding wheels or wire brushes. Guards fitted with chip breakers.

BELL TYPE CONSTRUCTION: Provides full clearance so that long straight pieces may be ground across the face of the machine.

CAPACITOR START MOTOR: Uses low starting current . . . actually less than 15 amps. are consumed.

VOLTAGE: Standard models of the ⅓ H.P. and ½ H.P. grinder require 110 Volts, 50/60 cycle AC current. Standard 1 H.P. grinder takes 220 Volts, 50/60 cycle AC current. Special voltage models available.

GRINDING WHEELS

of natural aluminous oxide abrasive . . . fully vitrified. From 60 grit for fine grinding to 24 grit for heavy work.

WIRE WHEEL BRUSHES

High quality wire and metal, bound to prevent chips flying loose. Crimped bristles cannot bend or break.

WHEEL DRESSER

Quickly trues, cleans grinding wheels. Protective hood over cutters. Includes extra set of easily inserted cutter wheels.

STURDY EYE SHIELDS

Thick safety glass for clear vision, protection. Sturdy aluminum frame. Easily attached to grinder.

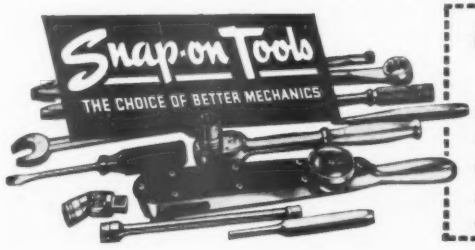
DRILL GRINDING ATTACHMENT

Sharpens any drill from 3/32" to ½" in diameter with both lips ground identical in length, clearance and angle. Micrometer screw controls feed.

SNAP-ON TOOLS CORPORATION

8044-B 28th AVENUE • KENOSHA, WISCONSIN

International Division: Kenosha, Wis., U. S. A.



SNAP-ON TOOLS CORPORATION
8044-B 28th Ave., Kenosha, Wisconsin

Please send me catalog containing more details about Bench Grinder and accessories.

Name.....

Position.....

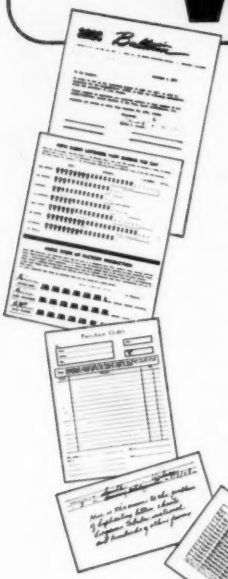
Company.....

Address.....

City.....( ) State.....

Even I can make perfect BW prints on a

BRUNING WHITEPRINTER



Here is the answer to the problem of duplicating letters, charts, diagrams, tabular material, and hundreds of other forms that up until now have required manual transcription, retyping, messy carbons, costly stencils, and hand-staining inks. And it's as simple as ABC . . . any girl in the office can do it . . . and will like to.

Just use translucent paper for your original copy and the Bruning Whiteprinter does the rest. Many companies are standardizing on this type of paper for all records including letterheads. It is strong, handles easily and looks well. Then, when duplicates are required you simply feed the original into the BW machine with BW paper and out come your copies ready for use . . . all in a matter of a few seconds. It's just as simple and inexpensive to make one copy as a hundred the BW way . . . and you'll be surprised at the extremely low cost per print.

Send today for this folder describing the new Model 21, an ideal machine for office use. See how the BW process revolutionizes office copying procedures. There is no obligation.

Model 21 Bruning Whiteprinter for moderate print production.

Charles Bruning Company, Inc.

Since 1897

4706–08 West Montrose Avenue, Chicago 41, Ill.

New York - Chicago - Los Angeles - And 11 Other Cities

It is available in tilt, non-tilt, wagon, or dolly types, with 4-, 6-, or 8-in.-diameter wheels of semi-steel, aluminum, cushion rubber, hard rubber, or plastic. The truck is a companion model to manufacturer's Load Carrier and will use all the standardized accessories normally used on that truck. The Market Forge Co., 25 Garvey St., Everett, Mass.

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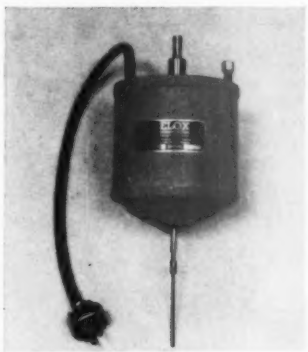


Electrical Erosion Disintegrator

Light-weight, portable electrical erosion disintegrator, small enough to be kept on a tool-crib shelf, may be carried to the job in one hand, and set into the chuck of any drill press when needed. Called the Model X, it is designed to remove taps, drills, reamers, studs, and pins in sizes from 0.085 inch upward. The only connections needed are city water and electricity at lighting voltage. Built-in self-feeding feature is said to provide a fast, clean cut regardless of the nature of the job, size, depth, type of hole, or kind of metal. When used on jobs where rust inhibitors are required, a circulating pump can be used to replace the city water. Manufacturer states that the disintegrator will not anneal the work, that there is no distortion, electrolysis, or mutilation of any kind, and that the hole-wall or thread is not damaged. Elox Corp., Clawson, Mich.

•

Abrasive Paint

For use on floors and other surfaces where slippery conditions prevail, fire-retardant, non-slip abrasive paint, called Sure-Foot, is said to prevent accidents; increase efficiency of men working around machines where oil, grease, cutting compounds, or water solutions are present; and to protect floor surfaces against heavy traffic. The carbide crystals that provide the abrasive properties are said to adhere to any floor surface. Applied by brush or trowel, the paint dries over night. Where heavy traffic wears through the paint, a second coat may be applied without chipping or removing the old paint. Available in gray, red, black, green, and blue, the paint is packaged in one-gallon cans and five-gallon kits. Manufacturer claims that one gallon

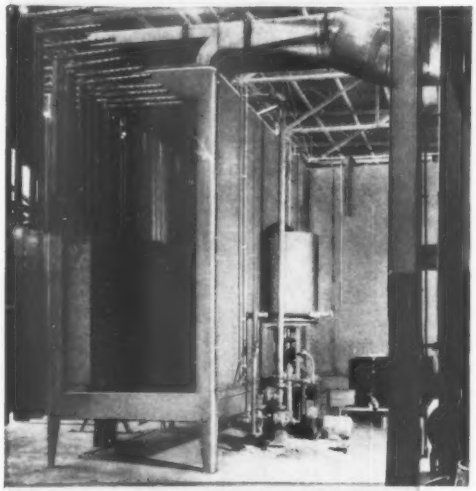
COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT

General view of the Complete Mahon Finishing System installed in the Martin-Parry Corporation's plant, Toledo, Ohio. This system consists of Metal Cleaning and Chemical Preparation Equipment, Dry-off Oven, Flow Coating Machine, Drip Area Enclosure, and Final Bake Oven.

. . . Combination Gas and Oil Fired!

Here is another typical Mahon solution of a finishing problem which involved prime coating metal doors and frames, metal wall panels up to ten feet in length, and a variety of other metal parts of many shapes and sizes. Combination gas and oil fired heating units were engineered into this entire system—for Metal Cleaning and Chemical Preparation Equipment as well as Dry-off and Final Bake Ovens . . . change over from gas firing to oil firing may be accomplished in a matter of seconds without interrupting production. When you contemplate new, modern finishing equipment—regardless of what your finishing problem may be—remember that Mahon has pioneered development in this highly specialized field for twenty-eight years . . . this broad experience, which covers many diversified industries and is world-wide in scope, together with constant experimental research, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. Better planning, better engineering, and a better and more economical job of finishing is the result. See Sweet's Mech. Ind. File for complete information.



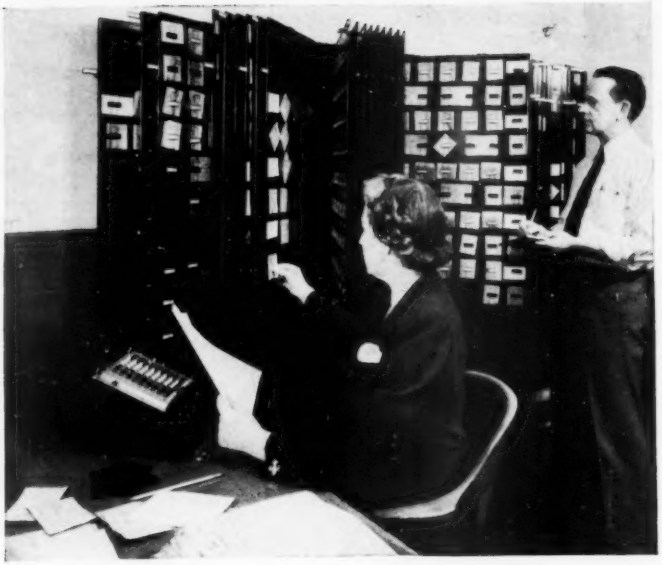
Mahon Flow-Coating Machine for applying Prime Coat on Steel Wall Panels, Metal Doors and Frames, and other Parts—part of the Complete Mahon Finishing System in the Martin-Parry plant, Toledo, Ohio.

THE R. C. MAHON COMPANY

Home Office and Plant, Detroit 11, Mich. • Western Sales Div., Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Chemical Preparation Equipment, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply System, Drying and Baking Ovens, and Paint Reclamation System. Also, Core Ovens, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.

MAHON



UNIVERSAL PRODUCTS Simplified Control of Auto-Parts Production, Costs and Tools thru McCaskey

Twenty-one years ago the Universal Products Corp., Dearborn, Mich., adopted McCaskey Control of production, assembly, costs and tools for the manufacture of many varieties and sizes of universal joints and drive shafts. The simplified procedures that cut unnecessary operations then and gave them prompt, accurate control are equally effective today.

Duplicate time tickets and a few other essential forms provide data for complete control at one-writing. Repeated postings of the same information have been eliminated. One copy is quickly filed on the Planning Boards shown above, providing a visible record of progress or work-in-process by production order numbers, parts and operations.

The other copy gives the Accounting Department identical data for cost records. There are no delays. Both are immediately available at the end of operations or shifts.

McCaskey Control in the tool cribs has stopped the disappearance of tools, loss of time by employees at the crib and idle time of their machines, tool breakage and excessive inventories, and has brought numerous other real savings.

Write for a demonstration of this "McCaskey Simplification" and suggestions for applications to your particular needs—or send for descriptive folders. No obligation, of course.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

spreads two coats over areas from 65 to 75 square feet. Frost Paint & Oil Corp., Minneapolis 13.

•

Non-Electric Magnetic Drum

Self-energized magnetic drum requiring no electric current to produce a magnetic field is adaptable for the automatic removal of tramp iron and fine ferrous contaminations where materials are conveyed in spouts, chutes, and similar conveying systems, not employing belts. It may also be used for the separation of ferrous from non-ferrous metals. Device consists of a revolving cylindrical shell surrounding a stationary high-powered permanent magnet. The magnet covers about half the cross-sectional area of the drum. Material is fed onto the drum shell. Non-magnetic material is discharged first, while the attracted portion is held against the shell until it passes out of the magnetic field. Available in eighteen different sizes, including 12-, 18- and 24-in. diameters, and in drum widths up to 50 inches. The drum may be ordered as a separate unit or complete with housing. Drum and housing, of all-metal construction, are fully enclosed. Eriez Mfg. Co., 481 East 12th St., Erie, Pa.

•

Welder-Caused Radio Noise Eliminator

Eliminating high frequency radio interference caused by welding equipment, a built-in control, using what is called a "balanced wave," is now being incorporated in all manufacturer's inert-arc welders. Device is said to reduce the duration of welder-caused radio noise to a small fraction of a second, comparable in effect on radio reception to the flicking of a home light switch. The

MEASURING SATISFACTORY PERFORMANCE

. . . IN EVERY TEST!

QUAKER PACKINGS ARE "PRE-TESTED" TO ASSURE PERFECT FIT, LONG LIFE, MAXIMUM EFFICIENCY

Packings to be efficient must be perfect in fit . . . must form a tight seal in pumps, flanges, valve stems, piston rods to prevent leaks . . . must be of exact quality to meet the operating requirements of specific conditions.

That's why Quaker Packings are "pre-tested." Carefully calipered for size and fit . . . painstakingly checked for quality. Above we see the final test, one of many pre-tests Quaker Packings must go through before they are ready for usage. Tests that are safeguards against costly leaks, troublesome shutdowns, loss of production.

There's a Quaker packing for every type of service—water, air, gas, oil, acids at extreme temperatures . . . all pre-tested for better performance.

HOSE THAT LASTS

. . . because it has been pre-tested to stand pressure and resist wear. Quaker Hose is available for use with air, water, steam, volatiles, acids and gases.

FOR PEAK HORSEPOWER

Quaker belts are pre-tested for every industrial need . . . belts of all kinds that assure peak efficiency under all operating conditions.

QUAKER RUBBER PRODUCTS

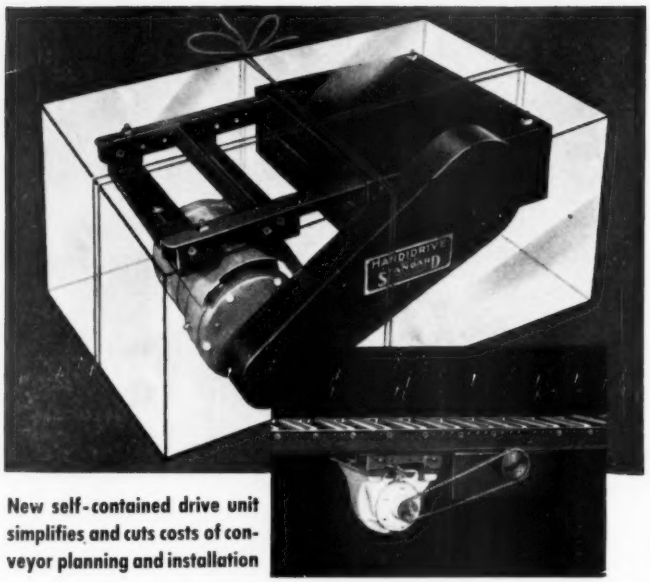
QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA. • New York 7 • Cleveland 15 • Chicago 16 • Houston 1
Western Territory
QUAKER PACIFIC RUBBER CO. • San Francisco 10 • Los Angeles 21 • Seattle 4

New "Power-Package" Unit for Roller and Belt Conveyors

THE STANDARD

HANDI-DRIVE



New self-contained drive unit simplifies and cuts costs of conveyor planning and installation

Here it is! A packaged power unit that gives every conveyor user the opportunity to be his own layout engineer — to change his conveyor system to suit varying plant conditions in a minimum of time!

Converts gravity conveyors to live belt or roller conveyor quickly . . at low cost

The Handi-Drive is designed to provide quick, simple conversion of an ordinary roller conveyor to a moving or "live" belt conveyor or a conveyor with power driven rollers. Equally important, using standard units you can build a conveyor system custom-planned to your individual plant needs. Units are stocked at the factory — get them now!

If you want to convert your present gravity conveyors to powered units — or if you want to install your own new system . . . send for the Handi-Drive Bulletin No. FM-29. It gives you complete design information and prices — tells you how to lay out your system, gives complete data on inclines, belt and roller widths, curves, weights to be handled and types of packaging or units to be moved. Write: Standard Conveyor Company, North St. Paul, Minnesota.

SEND FOR HANDI-DRIVE BULLETIN

Standard
GRAVITY & POWER
CONVEYORS

balanced-wave welder is said to eliminate the continuous use of high frequency voltages by balancing the current with a bank of series capacitors, so that pure a.c. flows between the electrode and the work. The welding arc is thus stabilized without the use of radio-frequency energy, making filtering or shielding unnecessary, according to the manufacturer, who states that use of the system results in a cleaner, more easily controlled weld, and a saving in the argon gas used. General Electric Co., Apparatus Bureau, Schenectady 5, N. Y.

•

Conductor Cord Trolley

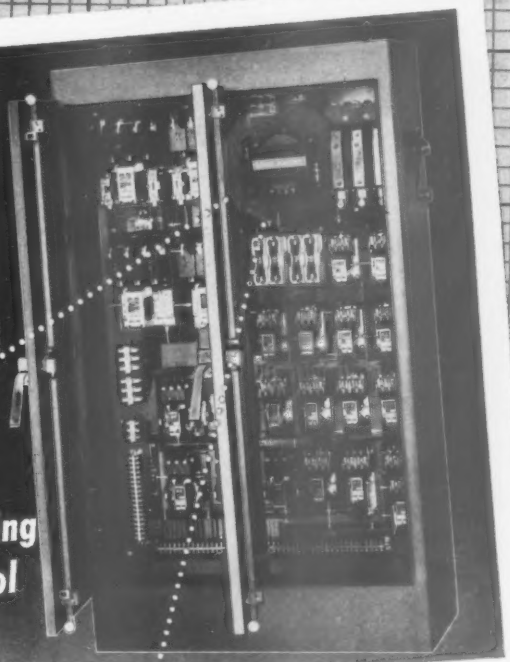
Flexible conductor cord trolley, called "Budgit," is intended to supply current to electric hoists and other mobile equipment operating on monorail tracks. Conductor cord is supported by the trolley on the same track on which the hoist is installed. This holds the conductor cord in place around curves on monorail tracks and allows it to pass through the same switches as the hoist trolley. Current may be supplied to hoists with this device for tracks as long as 175 feet, in which there are curves and switches. The conductor cord is kept up out of the way by this method and the drop of the cord when looped may be kept to as little as two feet. Maxwell, Manning & Moore, Inc., Shaw-Box Crane & Hoist Div., Muskegon, Mich.

•

High-Temperature Self-Locking Nuts

For fastener applications where the temperature ranges from —65 to

DESIGN LEADERSHIP

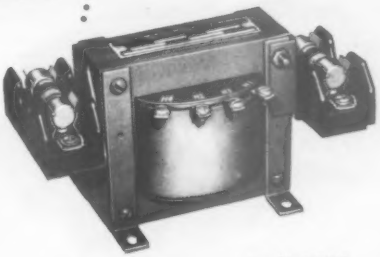


Another good reason for selecting Square D Machine Tool Control

Square D's line of machine tool control is an ever-growing line—keeping pace with the expanding requirements of the machine tool industry. That's why practically any performance requirement can be met with a combination of standard Square D devices, every one of which is designed specifically for machine tool applications.

New Control Transformers a good example of Design Leadership

Rapidly growing demand for the low voltage safety element in motor control circuits has focused attention on the need for a transformer designed to supply A. C. magnetic starters, contactors and solenoids typical of such systems. Square D's new line of transformers meet that need—exactly.



These features make it easy to meet Low Voltage Requirements

Lower Voltage Drop—unusually low impedance gives good regulation. Designed to handle the high inrush currents typical of A.C. magnets.

Secondary Circuit Protection—provided by easily adding Square D bracket and fuse block unit-assembly. One or two can be added to any of the transformer sizes—maximum flexibility with minimum stocking.

Dual-Voltage Primary—(*optional*) primary winding reconnectable for either 220 or 440 volts—required by "Automotive Standards."

Write for Bulletin 215...Square D Company, 4041 N. Richards St., Milwaukee 12, Wis.

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

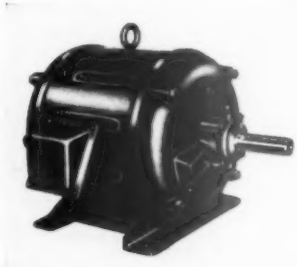
Music Spring Wire
Johnson Laboratory controls every step in wire production from raw material to finished product. Scientific chemical and physical analyses control quality, beginning with the selection of the best material for each product and carrying on with control of processing operations such as heat treating, die traction, special lubricants used in wire drawing.
JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.
New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

+1200 degrees F., line of self-locking nuts is said to provide permanent protection against vibration, impact, and stress reversal in both fully seated and positioned settings. For high temperatures, the Z-1200 series is said to be suitable for applications to +1200 degrees. This series is suitable for use on exhaust manifold systems and other installations where high temperatures create strength and seizure problems.

In the medium to high range, the ZE line provides a nut claimed to withstand sustained temperatures up to +550 degrees, without seizing the bolt or galling the thread, even after repeated exposure to such high temperatures.

For the temperature range between −65 and +250 degrees F., nut with a red elastic collar is said to hold permanently in position anywhere on a bolt or stud without frictional aid from bolt tension or seat pressure.

Elastic deflection built into the locking beams of both the ZE and Z-1200 series is said to make it possible to reuse the nuts interchangeably, since their design permits locking torque within the tolerance range of Class 3 bolts. Both the ZE and the Z-1200 series are available in hex and anchor styles. The ZE line comes in five thread sizes, ranging from 10/32 to the fractional size of $\frac{3}{8}$-24 in National fine series, with the 8/32, coarse, also available in the hex nut. For the Z-1200 series, hex nuts come in four thread sizes, from 10/32 to the fractional size of $\frac{3}{8}$-24. Anchor nuts in this series are available in three sizes: 10/32, $\frac{1}{4}$-28, and 5/16-24. The Elastic Stop Nut Corp. of America, 2330 Vauxhall Road, Union, N. Y. •



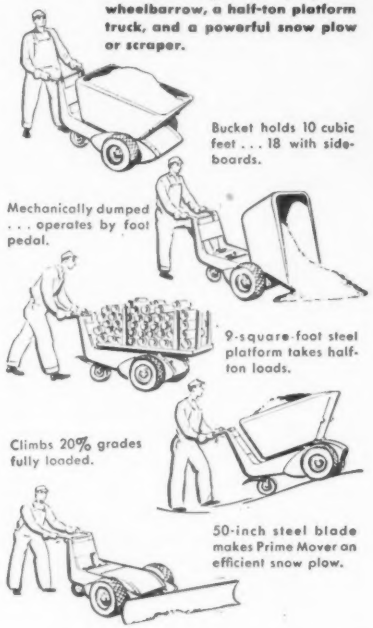
Large Drip-Proof Motor

Drip-proof polyphase motors are available in 254, 284, 324, and 326 frames formed of heavy rolled steel, shaped to accurately center the stator core and to provide passages between the frame and the core for ventilation. An auxiliary fan, larger in diameter than the armature of the motor, draws in air through the opening in the front plate, forces it through these passages, and out through the plate openings on the drive end. Screens prevent the entrance of rags, paper, or rodents. Both sleeve-bearing and ball-bearing motors are drip-proof when mounted in the normal horizontal position and, when the end plates have been correctly rotated, remain drip-

A 15-minute demonstration will show you how to

SAVE UP TO 20 MAN-HOURS A DAY

You can make these savings with the BELL Prime Mover . . . a new conception in materials handling, plant-maintenance equipment, and all around utility . . . a machine that combines the functions of a giant self-propelled wheelbarrow, a half-ton platform truck, and a powerful snow plow or scraper.



Bucket holds 10 cubic feet . . . 18 with sideboards.

Mechanically dumped . . . operates by foot pedal.

9-square-foot steel platform takes half-ton loads.

Climbs 20% grades fully loaded.

50-inch steel blade makes Prime Mover an efficient snow plow.

The BELL Prime Mover

FEATURES:

- gear driven . . . no belts or chains
- fully enclosed engine protected against dirt and moisture
- clutch, engine, transmission all run in oil
- switch from bucket to platform without tools . . . in less than a minute
- turns in its own length (63½"); width 31½"
- 3-gallon tankful of fuel gives 8 hours continuous service

A PRODUCT OF BELL *Aircraft* CORPORATION

*PATENTS & T. M. REG. PENDING. COPYRIGHT, 1949

● Hundreds of plants now use one or more Bell Prime Movers to haul bulk materials to and from processing stations and to relieve workmen of heavy lifting and pushing. These plants report savings in payroll as high as $36.00 a day for each Prime Mover.

Not only do Prime Movers speed production and cut costs, they also contribute to morale. For example, a tannery purchased its Prime Mover simply to make a disagreeable and heavy job easier for workmen. Another plant bought a machine so as to utilize the services of an elderly worker no longer able to do heavy labor.

Wherever wheelbarrows or hand trucks are used in your plant, the Prime Mover should be carefully considered. Not only will it perform this work better and at lower cost, but it can be shifted to other duties . . . plowing snow, grading driveways, hauling construction materials or maintenance equipment. Its versatility and usefulness in and about a plant are virtually unlimited . . . but see this for yourself at a demonstration.

Simply sign the coupon and clip it to your letterhead. We'll put you in touch with a nearby distributor . . . a member of our nationwide sales and service organization.

SEND COUPON NOW!

BELL AIRCRAFT CORPORATION, P. O. Box 1F2, Buffalo 5, N. Y. M

Please send me facts on the Bell Prime Mover. Who is the nearest distributor?

Name_____ Company_____

Address_____ City, Zone & State_____

RUST

Costs the Nation $6,000,000,000* Yearly!

Day and night—*twenty-four hours a day*—rust gnaws at your property. Not as dramatic as a tornado or other fear-inspiring disaster, rust costs you plenty in a year's time. You pay your full share of the nation's annual $6 billion loss from rust . . . unless you protect iron and steel surfaces against this *metal-consuming* menace.

RUST CAN BE STOPPED! Industry, railroads and public utilities find Rust-Oleum the best answer to their rust problems. It seals the surface so thoroughly that rust can't get started. Applied to iron and steel—even where rust has already begun—Rust-Oleum resists destructive conditions . . . rain, snow, dampness, salt air, heat, fumes and ordinary weathering.

*Estimated on the basis of 2% wastage of iron and steel due to rust.

● ***Get the Facts!***

Stop this destruction. Metal replacement is costly! Save your property with Rust-Oleum. It gives lasting protection. Tell us your rust problems. We'll send you specific recommendations promptly. See our complete catalog in Sweet's, or write us today for your copy.

Rust-Oleum is available for immediate delivery through Industrial Distributors in all principal cities . . . who stock Rust-Oleum and other factory supplies for your convenience.

RUST-OLEUM CORPORATION
2437 Oakton Street, Evanston, Illinois

RUST-OLEUM
Stops Rust!

proof in side wall or ceiling horizontal position since they have no openings in the frame. Wagner Electric Corp., 4600 Plymouth Ave., St. Louis 14.

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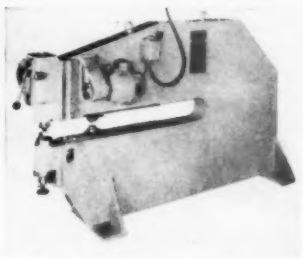

Metal Forming, Cutting Machine

Sheet and plate metal working machine, called Pullmax, is said to do beading, folding, and straight, circular, or design cutting of metal up to $\frac{3}{8}$-in. thickness. Cutting is accomplished by two tools, the upper one operating at high speed, so that the metal being worked is not chipped or deformed, and the edges are smooth and perpendicular. Cutting tools do not penetrate the metal, but shear it to the breaking point. A locking center device facilitates production of circular plates, and in conjunction with other tools may be used for operations such as slot cutting, nibbling, beading, and folding. Available in seven sizes for working various gages of metal. Pullmax Co., 5222 No. Spaulding Ave., Chicago.

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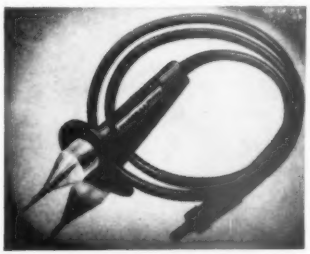


D.C. Voltage Multiplier

Voltage multiplier extends d.c. voltage measurements to 10,000 volts. It is designed to extend the applications of manufacturer's multi-purpose vacuum tube voltmeter, called Polymeter, to experimental power supply, industrial electronic equipment, electronic flash tube circuit, and other high-voltage d.c. circuits. Unit consists of a 48-in. plug-in flexible lead tested for 22,000-volt breakdown; nickel-plated brass contact pin mounted in tapered polystyrene rod $1\frac{3}{4}$ inches long; a removable bakelite safety flange 2 inches in diameter; and varnished bakelite handle, $4\frac{1}{4}$ inches long, enclosing dropping resistor tested at 30,000 volts. When used in place of the standard Polymeter low - voltage probe, it multiplies each of the present d.c. voltage ranges by a factor

Get Action *LIKE THIS:*

★ **24 hours to make and install coils in 250 HP motor**

★ **Rebuilt 250 HP slip ring motor in 2½ days**

★ **3 days to rebuild 125 HP motor including 200 miles of truck shipment**

THESE ARE ACTUAL JOBS turned out by Giles Armature and Electric Works, Marion, Illinois . . . the kind A-C Certified Service Shops are doing every day!

When every hour costs money . . . when production is stopped . . . Allis-Chalmers Certified Service on motors, transformers, pumps, etc., can get you rolling again, *fast*. Dependable for prompt service on routine work, too.

Call Your A-C Office or Dealer. A-C Certified Service Shops are hand-picked, independent repair shops meeting rigid standards for equipment, trained personnel and business reputation for square dealing. For the one nearest you, ask your Allis-Chalmers Dealer or District Office.

Check with us for *new* motors too. Stock or quick delivery on many sizes, types.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks. A 2594

ALLIS-CHALMERS, 1078A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Sold . . .
Applied . . .
Serviced . . .

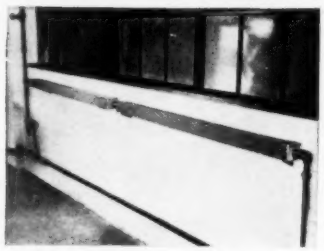
by Allis-Chalmers Authorized Dealers, Certified Service Shops and District Offices throughout the country.

MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

TRANE INDUSTRIAL
Weather Magic

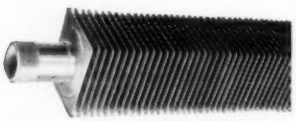


Wall-fin shown here is covered with expanded metal shield. For office use, wall-fin may be dressed up with a very compact cabinet.

Stop window drafts with Wall-Fin

The wall-fin type of heater is simply a length of steel pipe with a series of steel fins on it. Husky, bump-proof, it serves as an industrial type convector. Properly applied, it not only improves factory heating, but also reduces heating cost.

Wall-fin is highly effective when used as a part of an industrial unit heater system. Design the system with enough unit heaters to take care of normal heat loss, and use wall-fin around skylights and below windows to neutralize drafts at their source.



Wall-fin may be used bare as shown here, or with cabinets or shields. (Shields are for protection of workers, not for husky wall-fin!)

An interesting article on this subject appeared in Trane Weather Magic, Vol. 11, No. 8. This article analyzes two identical factory spaces, one using unit heaters alone, and the other using the unit heater-wall-fin combination suggested here. Extra copies of this article are still available if you would like to read it.

The regular wall-fin bulletin is No. DS-392. You can secure one from the Trane sales office in your area, or direct from the factory.

THE TRANE COMPANY
LA CROSSE, WISCONSIN

Manufacturing Engineers of Heating, Ventilating and Air Conditioning Equipment—Unit Heaters, Convector-radiators, Heating and Cooling Coils, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialties . . . In Canada, Trane Company of Can., Ltd., Toronto.

of ten. Radio Tube Division, Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18.

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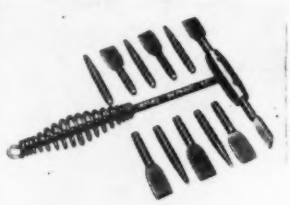

Chipping Tool With Replaceable Bits

Replaceable bits for weld chipping hammer, called "Re-Bit Tomahawk," are locked into the head in any position by means of a simple taper. Maker states that the blades have been designed to provide access to tight spots, a wide chipping edge, and good visibility. The tool is available in 12- and 6-oz. weights, with choice of Flex-O-Steel or wood handles. Atlas Welding Accessories Co., 707 East Lewiston, Detroit 20.

•

Portable Electric Polisher

Vertical spindle construction of 10-in. portable electric polisher, Model 109, is said to enable operator to reach difficult places. Lightweight aluminum housing completely encloses the tool, which weighs 10 pounds. Its rear grip has a trigger switch with positive lock for continuous operation. The side handle is removable and can be attached to either right- or left-hand side. A spindle lock is provided for pad change. The polisher is driven with a universal 110-volt motor, 25 to 60 cycles, 5.5 amperes, at 1000 r.p.m. free speed, 700 r.p.m. load speed. Accessories include one 9-in. backing pad, one 10-in. lamb's wool bonnet, and 15 feet of rubber-covered three-conductor cable with plug and cable strain reliever. The Bradford Machine Tool Co., Cincinnati.

•

Corrosion-Resistant Repair Cement

Substance, called Carbo-Fix, can be applied with putty knife to repair areas pitted from corrosion. Maker states that it repairs glass and glass-lined equipment and can hold broken or cracked parts together permanently or temporarily, depending on the type of service involved. It can be used to make joints between glass

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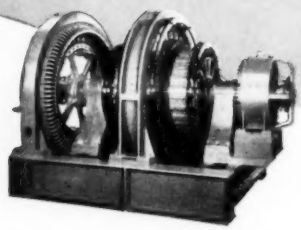
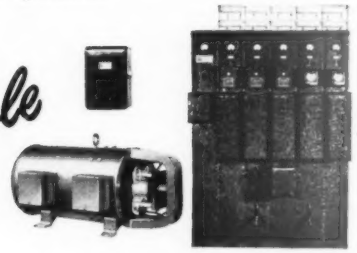
for example



FOR ELECTROLYTIC PROCESSES

E. P. Electrolytic Motor-Generators employ Undercut Commutator Mica to prolong commutator and brush life; Pole Spacers to help assure sparkless commutation; Micrometer Adjustment of Interpoles, an exclusive feature, to guarantee outstanding performance; Correct Mechanical Design that means every part of the motor-generator is swept by a cooling stream of air; and Fully Accessible Construction for easy inspection.

ASK FOR BULLETIN 202



FOR INDUSTRIAL-TRUCK BATTERY-CHARGING

In 1910, The Electric Products Company introduced the first Automatic Battery Charger. Today they most efficiently and advantageously combine completely automatic operation . . . the modified constant-voltage method of charging . . . individual application design . . . elimination of complicated control or ventilating systems . . . and specialized low-voltage designing.

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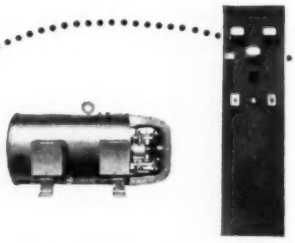

FOR STANDBY BATTERY-CHARGING

Since 1923, Diverter-Pole Motor-Generators have proved to be the most reliable, maintenance-free and efficient source of direct current for Control Bus Battery Charging. They assure maximum battery life, give full-automatic operation and protect themselves against harmful overloads. Requiring only infrequent inspection, they are extensively used in isolated automatic and supervisory-controlled substations.

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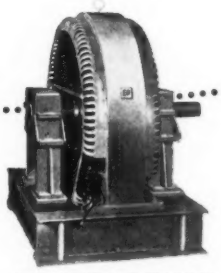

SYNCHRONOUS MOTORS

Since 1923, The Electric Products Company has been building Synchronous Motors for applications that demand a quality far superior to that of ordinary commercial machines. Proof of this accumulated design and manufacturing experience is evident in every unit. From stator frame to rotor windings, E. P. specialization is your guarantee of long life and trouble-free operation.

ASK FOR BULLETIN 211

also

INDUSTRIAL DYNAMOMETERS
SPECIAL MOTORS AND GENERATORS
FREQUENCY CHANGERS
SYNCHRONOUS GENERATORS

EP X-36

THE ELECTRIC PRODUCTS COMPANY

1720 CLARKSTONE ROAD CLEVELAND 12, OHIO

tubes, and, together with a priming coat of Carbo-NTS, can be used with practically any metal, according to the manufacturer. Compound is prepared by mixing a fluid and a powder into a paste which sets fairly slowly at room temperature. In hot weather, it may set in less than an hour. Carboline Co., 7603 Forsyth Blvd., St. Louis 5.

•

Electric Sprayer

For spraying lacquer, gloss enamel, insecticides, and disinfectants, the VS-500 electric Vibro-Sprayer, 24-oz. capacity, is a self-contained unit weighing 1¾ pounds. It is 8¼ inches high and 6¼ inches deep. Manufacturer states that it operates without aid of a compressor or other extra equipment. Entire operating mechanism, including pressure source, is inclosed by the molded housing. Burgess Battery Co., Handicraft Division, Lake Zurich, Ill.

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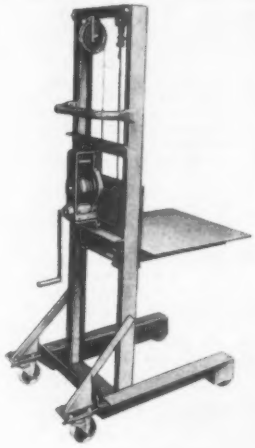

Portable Elevator

Operated by one man, portable elevator No. 500 may be used wherever loads up to 500 pounds must be lifted from 1 to 5 feet. Applications include placing dies in presses or die racks; loading and unloading motor trucks; piling cases, barrels, or bales; raising loads to platforms or storage; and for ceiling and lineshaft

How carton assembly costs were cut 50%

Acme Silverstitch helps fixture manufacturer make stronger carton in half the time

They wanted a stronger carton assembled at less cost.

So Duro Test Corporation called the Stitching Division of Acme Steel Company.

Working with members of their shipping department, the Acme expert helped install a production-line packaging system built around an Acme Silverstitcher.

Now the Duro Test Corporation, North Bergen, New Jersey, packs its fluorescent fixtures in a stronger box in half the time, and saves 50% of previous labor cost. The finished package is a neater, better-looking job—for greater customer satisfaction.

Why not ask an Acme Shipping Specialist to look over your shipping and packaging problems? You won't be obligated, and savings are often substantial. Mail the coupon today for detailed information on what the Acme Silverstitcher can do for you.

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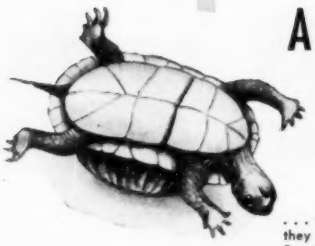


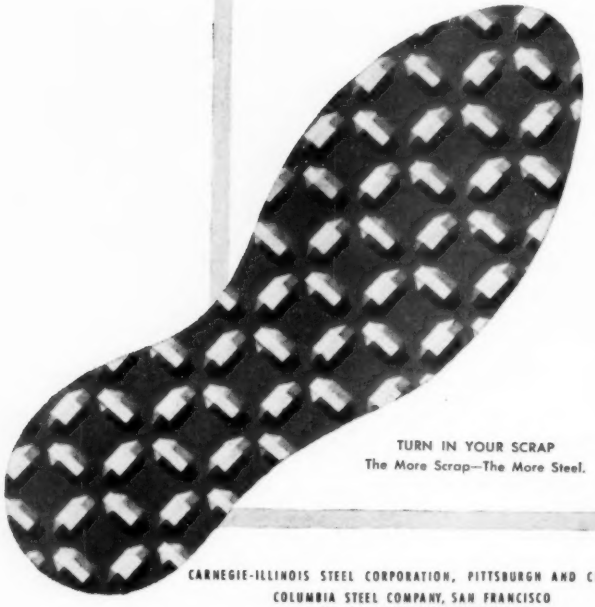
A turtle on his back is helpless

. . . and so are your plant workers when they lose their footing on smooth, slippery floors.

Unsafe footing can be costly—in injuries, in lost man-hours, and in decreased operating efficiency. Install U·S·S Multigrip Floor Plate wherever sure footing is essential. Whether it is wet or dry, Multigrip offers skid resistance and traction in all directions.

It's economical, too. Installations are permanent, reducing plant maintenance costs. It's easily cleaned . . . there are no pockets in which grease, dirt and water can accumulate. And the evenly spaced, flat-topped risers are comfortable underfoot, tend to lessen fatigue.

Get further information about Multigrip from your nearest steel warehouse or write to us direct.



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UNITED STATES STEEL

repairs. Crank on elevator is turned in one direction for raising the platform, reversed for lowering. Manufacturer states that capacity loads can be stopped at any point on the way up or down. Elevator has an over-all height of 6 feet, a lifting height of 5 feet, and a platform 24 inches square. The base wheels are 5 inches in diameter, and the platform when lowered is 5¾ inches from the floor. Other features include all-welded construction, cut spur gear reduction, oilless bushing, and floor brake. Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9.

•

Valve Reseating Tool

Aluminum-oxide cloth-backed disks used in this valve reseating tool are mounted on both faces of a flat steel body. The tool may be operated with an ordinary brace or hand drill equipped with a screwdriver bit. One side of the tool has a coarse abrasive disk, the other a disk of finer grit. Since the disks are changeable and reversible, the pitted or wire-drawn seat can be ground smooth with the coarse side, and a mirror-like finish put on with the fine side. Tool is designed for regular types of globe, angle, check, and gate valves, as well as other types of equipment, such as closet flush valves of both the diaphragm and piston type.

The reseater is self-aligning, and manufacturer states that no slivers or metal chips result from the grinding operation. Tools are packed in kits which include a supply of extra abrasive disks and two special faucet reseaters which are operated with an ordinary screwdriver. Set No. 60 is for valves ½ to 2 inches, inclusive, and set No. 80 for valves ½ to 3 inches. Grace Products Co., Box 2466, Birmingham, Ala.

•

Aluminum Jacketing

Corrugated light-weight aluminum jacketing for insulation protection comes complete with attached moisture barrier to prevent interior corrosion. Manufacturer states that it is easily applied, as it is fastened at the joints by screws. The jacketing itself is 0.0055-in. thick with 3/16-in. corrugations. Moisture barrier is impregnated with asphaltic compounds, then both faces are sealed with a mixture of gilsonite resins, waxes, and asphalt. Shipped in rolls

Simple as pinching a rubber tube

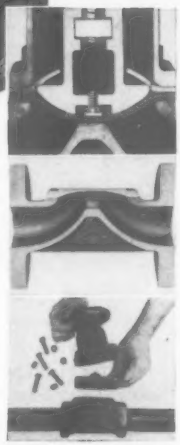
A GRINNELL-SAUNDERS DIAPHRAGM VALVE works on a simple principle . . . it pinches tight for positive closure and opens wide for streamlined flow. The working parts of the valve are completely isolated from the fluid . . . no corrosion, no contamination and no leaks. Choice of diaphragm material. Body materials . . . cast iron, malleable iron, bronze, aluminum, stainless steel. Body linings . . . glass, lead, rubber or synthetics.

NO METAL-TO-METAL SEAT . . . The large contact area on which this flexible diaphragm seats gives positive closure even when grit, scale or other solid matter is temporarily trapped.

MINIMUM RESISTANCE TO FLOW . . . Smooth streamlined fluid passage without pockets prevents accumulation of sludge and reduces friction resistance to a minimum.

MAINTENANCE REDUCED . . . The diaphragm is the only part that normally wears out. Replaced in a few minutes without removing valve from line.

Available in various combinations of valve bodies and operating mechanisms. Write for Catalog 2-S.



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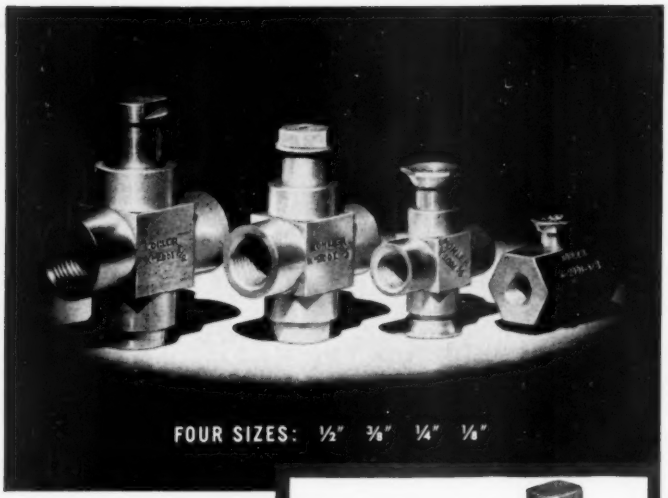
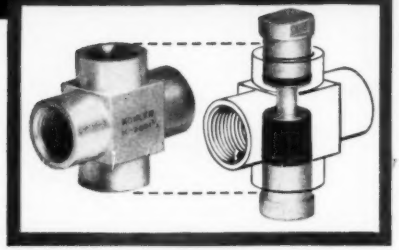


Positive Control for Vacuum and Air Lines



Precision Made . . . Leakproof

KOHLER ON-OFF VALVE

Kohler K-2001 valves can be easily adapted to all installations, and will positively control vacuum and air.

Stringent tests are applied to each valve before shipment. All rubber seals are specially lubricated for vacuum and air use to insure long, easy operation. Connections can be furnished as desired in the sizes illustrated above —each of which shows 2 internal pipe threads. K-2001 valves are designed for long hard use and have proved themselves on many different applications. Rugged, simplified design makes operation easy—you merely *push on; push off*.

The complete line of Kohler precision parts includes hand engine primers, check valves, plug valves, angle needle valves, air valves, restrictor valves, snubber valves and many fittings—all backed by the 76-year-old Kohler quality tradition. Prompt deliveries are assured by complete facilities, in one plant for die-casting brass, aluminum or white metal, sand-casting, forging, machining, plating and anodyzing. Kohler engineers will gladly develop valves to fit your special requirements. Kohler Co., Dept. 20-J, Kohler, Wisconsin.

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS

4 feet wide by 100 feet long, each roll weighing 63 pounds. The Childers Mfg. Co., 625 Yale St., Houston 7, Texas.

•

Lavatories

For use wherever it is important that water be automatically shut off when not in use, two new lavatories, the Lavalux and the Sanicor, are made of vitreous china. A foot pedal controls the flow of water, and a hand valve mounted on the top shelf of the lavatory makes it possible to adjust the heat of the running water. Water is supplied through a single spout, equipped with a spray to prevent splashing. A pop-up plug, with operating handle on the back of the spout, is provided for filling the basin. The Lavalux model is a flat-back lavatory for wall mounting, 18x15 inches over-all. The Sanicor is a corner model, 17x17 inches. Both are available in white and in colors. Crane Co., 836 South Michigan Ave., Chicago 5.

•

Wire-Mesh Filter Membrane

Wire-mesh membrane for use with manufacturer's standard line of filters consists of a cylinder constructed of Type 316 stainless steel Dutchweave wire cloth supported on the inside by a 1/16-in. perforated cylinder with a ring on each end to act as a bearing center. Mesh of the standard membrane is 20x250, but membranes can be furnished in any mesh required. All joints of the membrane are welded. Membranes can be used with either Filterbestos or diatomaceous earth as filtering mediums, and are interchangeable with porous stone membranes.

Since membranes withstand high pressures at high temperatures and

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Flat Ground Stock (Oil Hardening)
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TOP HANDS know the file that gives them the best and quickest results for the effort they put into the work. *It's a "Red Tang" File every time.* For this is the file with the teeth shaped like those of a metal-cutting saw . . . teeth that cut instead of scrape . . . *teeth that take off more stock per stroke,* rolling it off in coiled chips, like a lathe-tool.

Here's top value for your file-dollar. Simonds makes "Red Tangs" in top grade *only* . . . and that's the only grade of work you get from them. Tell your Distributor you want "Red Tangs" on your next order. *Then check the difference in your production.*

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RED TANG FILES

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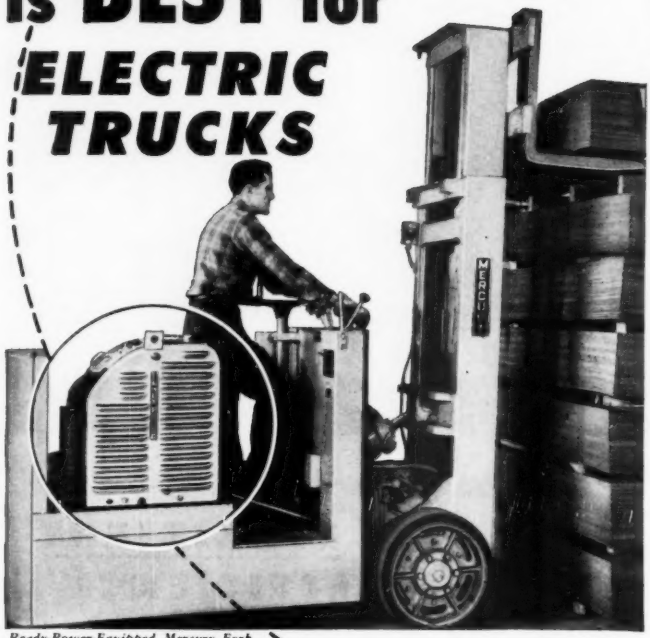
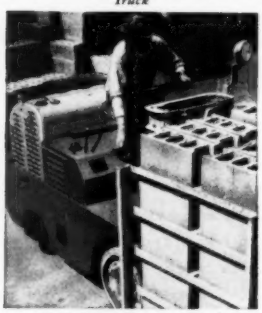
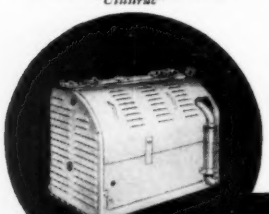
READY-POWER is BEST for ELECTRIC TRUCKS



Ready-Power-Equipped Mercury Fork Truck



Ready-Power-Equipped Clark "Utilitruc"



BEST because Ready-Power delivers "constant-peak" electric power generated right on the chassis by the Ready-Power gas-electric Unit.

BEST because Ready-Power Units are available to fit the specifications of any electric truck manufacturer and can be installed at your request.

BEST because *only* Ready-Power can give you the constant availability of gasoline PLUS the flexibility and low maintenance of electric drive.

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

can be used to filter any solution which does not attack Type 316 stainless steel, range of applications is said to be very broad. Membrane can be used without a filtering medium when solutions have fairly large suspended particles and only a fine straining operation is required. The thin wall of the cylinder is said to eliminate danger of plugging, and the wire-mesh construction is said to reduce the possibility of breakage. Titeflex, Inc., 505 Frelinghuysen Ave., Newark 5, N. J.

•

Fluorescent Fixture Tester

Testing device for fluorescent lamps and starters is designed to reduce the cost of operating fluorescent lighting fixtures, to prevent waste of good lamps, and to facilitate repair of defective circuits in equipment, according to manufacturer. A fluorescent lamp suspected of being worn out or defective is inserted downward through the support bracket above the tester base and is inserted at its lower end in a socket beneath the bracket. Upper end of lamp is connected to the socket at the end of one of the two extension cords issuing from the base. The other extension cord is plugged into a 110-volt, 60-cycle line. After throwing a selector switch to correct position for the given lamp size, operator holds line and lamp switches in On position until the ends of the lamp begin to glow. If the lamp fails to glow, it is defective; if it lights brightly upon release of lamp switch, it is in good condition; if it lights dimly, it should be discarded.

A fluorescent starter to be tested is positioned in a socket to the right on the base, and selector is moved as starter's type indicates. The line switch is held On for several seconds; if indicator lamp under the guard to the left of the starter begins to blink, starter is in good condition; if it fails to glow, or glows dimly but does not blink, starter is defective. Compco Corp., 2251 West St. Paul Ave., Chicago 47.

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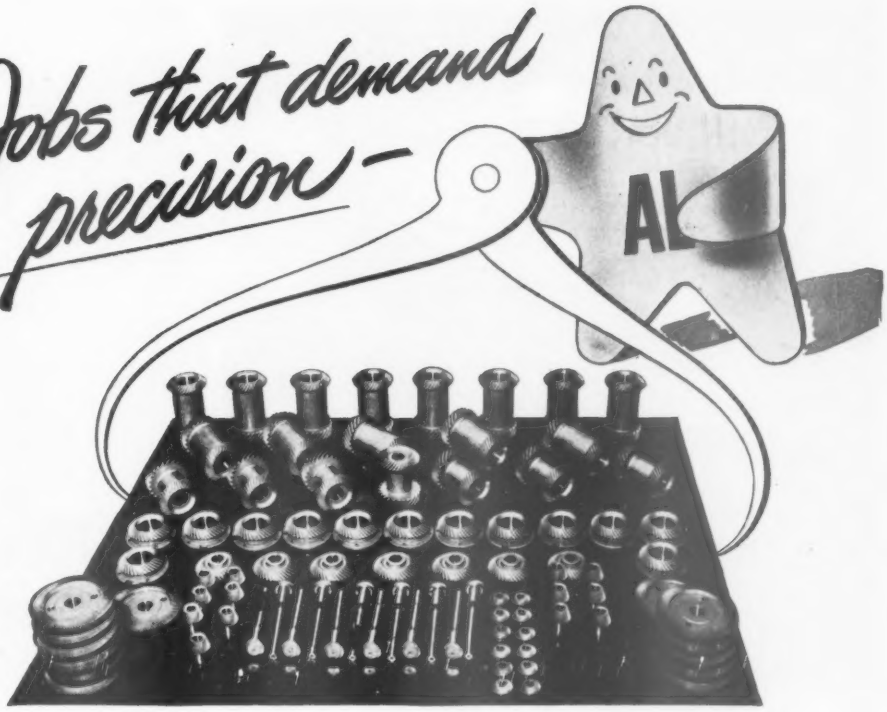
Paint for Concrete

Rubber-base, alkali-resistant interior enamel, Colorfloor XX, is suitable for painting basement floors and other concrete floors on or below grade,

Jobs that demand precision—



—they're the jobs for DEWARD Oil-Hardening Tool Steel

For Complete Data, write for the DEWARD BLUE SHEET

Contains full information, certified as laboratory tested and proved, on the physical properties and characteristics of DEWARD Tool Steel, and best methods of handling and treatment. *Send for your copy.*

ADDRESS DEPT. F-72

Wherever your specifications call for hardened machine parts in precision work, you'll gain greatest advantage by using DEWARD Oil-Hardening Tool Steel—famous for its freedom from distortion after heat treatment.

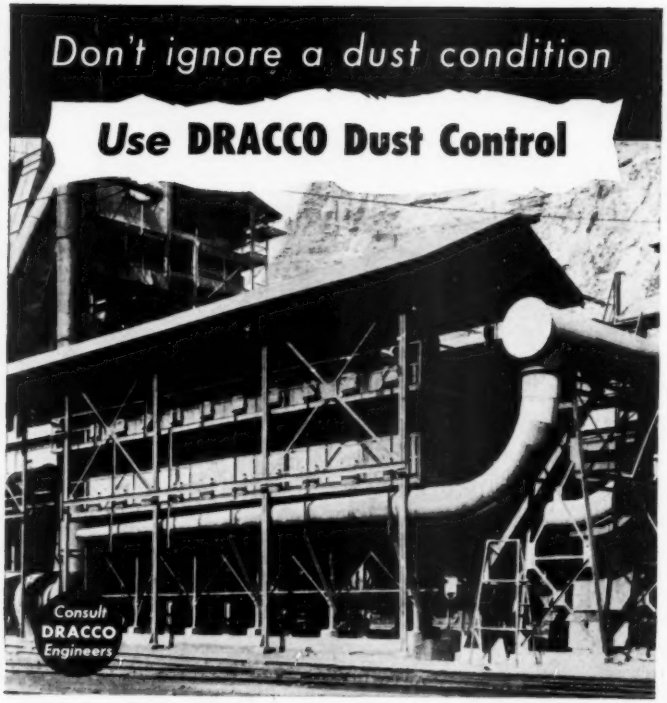
This quality caused the selection of DEWARD for the complete set of precision gears illustrated above, which must run absolutely true in operation. After grinding, the gears are heat treated at 1425-1500° F., oil-quenched and then drawn at 750° F., resulting in a hardness of 48-51 Rockwell C. With no distortion, the final regrind and lapping of the bolt before assembly becomes a simple, quick, low-cost operation.

For any jobs of this general nature, let us show you how DEWARD can save you time and money in production, give you a better finished job—*or both!* Our Mill Service Staff is at your command, without obligation.

ALLEGHENY LUDLUM STEEL CORPORATION
Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854 W&D 1779



• It never pays to ignore a dust condition even though it may seem of little consequence. A small amount of dust gets into equipment and reduces plant efficiency, perhaps more slowly but just as surely as larger amounts. Experience has shown that dust even in small amounts is very destructive and should be controlled. If you have a dust or fume control problem of any kind it will pay to consult DRACCO Engineers. For over 30 years they have analyzed and solved dust and fume problems of every description. Why not write?

DRACCO CORPORATION

4091 E. 116th St., Cleveland 5, Ohio *New York Office: 130 W. 42nd St.*

DUST CONTROL EQUIPMENT

PNEUMATIC CONVEYORS • METAL FABRICATION

as long as no hydrostatic pressure exists. Finish is said to resist acids, alkalis, soaps, oil, grease, alcohol, and to offer good abrasion resistance. On concrete floors that appear to be dry, two coats of this paint are said to protect rooms from dampness. No special primers or sealers are necessary. Substance can be brushed on, drying within 24 hours. Available in red, medium gray, and dark green. The Tremco Mfg. Co., 8701 Kinsman Road, Cleveland.

•

Rider-Type Lift Truck

Battery-operated rider-type lift truck, called the Transrider Stacker, has an over-all height of 83 inches with single lift of 66 inches. With telescopic lift mechanism, the unit can lift 130 inches. Truck is 97¾ inches long, with 36-in. forks; needs 57 inches to turn in intersecting aisles. Capacity is 2000 pounds with a 48-in. load; 2500 pounds with a 36-in. load; 2050 pounds with a 30-in. load; and 3000 pounds with a 28-in. load. Complete with two batteries, its weight is about 4000 pounds. It has three speeds forward and three in reverse, and an automatic tilt of 10 degrees backward and 5 degrees forward. Other features include drive on the load wheel; high-pressure hydraulic, automotive type controls, including foot brake and foot accelerator; dead-man control; full contactor control; ample road clearance for boxcar loading and severe ramp conditions; and simultaneous lift, tilt, and drive. Automatic Transportation Co., 149 West 87th St., Chicago.

•

Telephone System

Designated as No. 6-2-20 system, Key-BX telephone system incorporates a wiring plan said to make telephone service more flexible and efficient, particularly where there are several simultaneous outlets to the main exchange. The system eliminates the necessity of an operator on the floor type or cordless PBX switchboard. Each individual is his own attendant, with access to all incoming and outgoing trunks, and to every individual in the organiza-

1 **1760**—A strong back, sharp axe and plenty of time and patience were a *must* for the frontier homebuilder. He cleared the land, felled his trees, hewed logs to fit and hoped his house wouldn't leak when he finished.

2 **1875**—Lumber, the universal building material, was a budding industry. But woodworking machinery was hard pressed to keep pace with the tremendous demand. Urgently needed was low cost electrical power to boost output.

3 **1915**—Howell "Red Band" Electric Motors appeared. Applied to machines in woodworking and other important industries, these rugged, industrial type motors soon won wide recognition for making good on tough jobs.

WORKING WONDERS WITH WOOD

(Up to 225 Feet Per Minute)

4 **Today**—Electrically powered machines work wonders with wood. This modern moulder, for example, using 5 Howell Industrial Type Motors, can shave, trim and form four sides of a wood strip at the rate of 225 feet every minute . . . job costs are cut . . . *more* people enjoy *more* goods at less cost.

Here's another example of a tough industrial job solved by Howell Motors—the accepted industrial type motor.

Whether it's on planers, moulders, saws, lathes, pumps, fans, conveyors or dairy equipment, dependable, precision-built Howell Motors are an important source of power.

Are you using Howell Motors?

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.

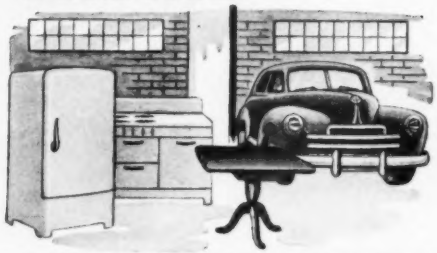
Howell Protected Type Motor

HOWELL MOTORS

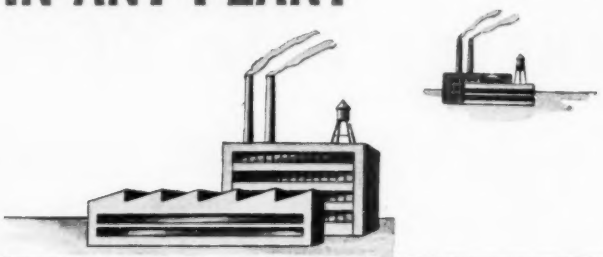
HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

ANY SURFACE



IN ANY PLANT



ANYWHERE

Can be coated with Highest Quality Finishes from a single source — SHERWIN-WILLIAMS

Walls, equipment, products—no matter what it is you need painted, no matter what conditions are prevalent in your plant (such as humidity, heat, fumes) . . . no matter where you are located—you can obtain the highest quality finishes specifically developed to do a superlative job, from one source . . . Sherwin-Williams —with 385 branches in principal cities from coast-to-coast ready to supply you!

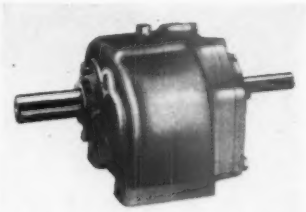
Investigate now the advantages, the economy of dealing with the world's largest paint manufacturer. The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio. (Houston and Dallas, Texas.)

AT THE START, CONSIDER THE FINISH

SHERWIN-WILLIAMS INDUSTRIAL FINISHES

tion connected to the Key-BX system. Equipment permits one to six trunks to a common battery manual or dial exchange; up to twenty telephone stations within the building; and one or two intercommunication circuits for talking between individuals, or for conference calls between several individuals. Kellogg Switchboard & Supply Co., 6650 South Cicero Ave., Chicago 38.

•



Two-Speed Transmission

Used to supplement or replace two-speed motors, mechanism of two-speed automatic transmission consists of two over-running clutches, one engaging in a clockwise and the other in a counter-clockwise direction. Manufacturer states that clutches are so arranged that by merely reversing the motor two speeds are provided on the output shaft, one at the 1.1 ratio, the other at a pre-selected reduction. Direction of rotation remains unchanged. The reversing operation is accomplished by means of a pushbutton, limit, or timing switch. In the 5-hp. model with a 1750-r.p.m. input, the low limit is a reduction of 6.31 to 1, but any pre-selected ratio from 1.1 to this low limit is obtainable. Transmissions are built to handle 5-, 10-, 15-, 20-, 25-, and up to 50-hp. motors. Western Mfg. Co., 3400 Scotten Ave., Detroit 10.

•

Metal Enclosed Switch

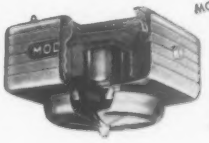
Die-cast gasketed aluminum housing totally encloses and seals Unimax Model KMX metal-encased switch against splashing oil, moisture, and abrasives. The switch mounts in the metal housing by means of a slip fit on two pins, integral with the side plate, whose centers fit the standard mounting holes of the switch. The metal housing can be installed without the basic switch; for side mounting, with threaded studs which project from the side-plate; for base-mounting, by capped base holes or adapter flange. Independent mounting of switch in housing allows unobstructed connection to the ter-

To everyone about to order unit heaters, Modine says,

"Look before you buy!"

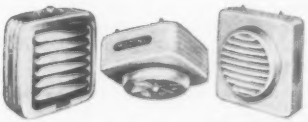
MODINE MAKES THIS SPECIAL OFFER!

Now you can check Modine's quality features . . . *without leaving your office.* Call your Modine Representative today to show you an actual Modine Unit Heater . . . to explain its advantages in detail. You'll like its attractive appearance, sound engineering, rugged construction. Examine Modine—compare it with other unit heaters before you make your decision.



Look at Modine Power!

See how motors must meet rigid performance requirements before they can team up with Modine Unit Heaters. Check motor's heavy-duty, totally enclosed construction. See how it's rubber-mounted, noise-proofed for silent service.



Look at Modine Line!

See how Modine's complete line of three distinct types and 47 basic capacities can solve your specific space heating problems. Find out how there's a Modine Unit Heater for every industrial or commercial need.

YES, look before you buy.. and you'll buy Modine!

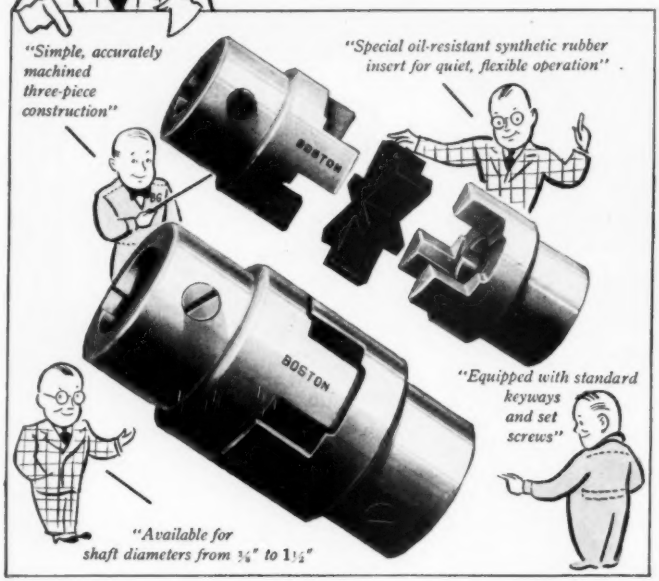
Guesswork is gone from unit heater buying when you compare Modine with all other makes. Yes—your best judgment will tell you Modine is the leader—the only unit heater which gives you ALL these important features. Modern Beauty . . . Individual Tube Expansion . . . Velocity Generator . . . Rugged Safety Fan Guard . . . Patented Direct Suspension . . . Built-in Air Control Device. What's more, you can choose from three types and 47 capacities to meet your specific heat, air delivery, height and location needs.

When you look before you buy, you'll see why Modine leads the field. Call your Modine Representative for further details. He's listed in the "Where-to-Buy-it" section of your phone book. Or write direct for Modine's new 52-page catalog. Modine Manufacturing Company, 1505 Dekoven Avenue, Racine, Wisconsin.

Modine UNIT HEATERS

NEW COUPLING by Boston Gear

"BE SURE YOUR NEXT COUPLINGS HAVE ALL THESE FEATURES . . ."


"Simple, accurately machined three-piece construction"
"Special oil-resistant synthetic rubber insert for quiet, flexible operation"
BOSTON
BOSTON
"Equipped with standard keyways and set screws"
"Available for shaft diameters from ¾" to 1½"

BRAND NEW DESIGN . . . These new Boston Gear Couplings are designed for quick, simple installation and long, trouble-free service without attention. Completely, accurately machined, they are intended for a wide range of industrial applications where *flexibility, ruggedness* and *durability* are required. These couplings require no lubrication and are not harmed by oil, dust or dirt.

AVAILABLE IMMEDIATELY FROM STOCK! There's a Boston Gear Distributor within fast shipping time of your plant who can supply you with these new couplings. Write for complete list of authorized distributors — or see our alphabetical listing in THOMAS' REGISTER for your nearest distributor.

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minals before the switch is inserted into the metal case, facilitating installation as well as switch circuit changes.

The two side plates are removable and interchangeable, permitting either left- or right-hand mounting. Entrance of dust, oil, and moisture is prevented by two Neoprene gaskets which fit the side plates, and a Neoprene diaphragm on the top of the housing which seals the junction where the stainless steel pin transmits the operating force to the switch element. A conduit hub connection has an internal ½-in. pipe thread. Over-all dimensions of the aluminum housing are 1-13/16x2¼x⅞ inches. Unimax Switch Div., W. L. Maxson Corp., 460 West 34th St., New York 1.

•

Reel-Dispensing Roller

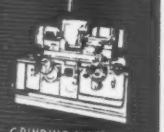
Designed with a front ramp to facilitate rolling heavy reels into place, device, called the No-600 Reel Roller, is made with two rollers in a heavy steel frame. The back roller is adjustable to different-sized reels up to 30 inches in width, and is mounted slightly higher than the front one to prevent the reel from being dislodged when cable is being pulled. A thumb screw may be tightened to keep roller from turning while reel is being removed. M. B. Austin Co., Northbrook, Ill.

•

Enclosed Magnetic Starter

For use in Class I, Group D hazardous locations, combination starter, with self-contained disconnect switch, is suitable for use with squirrel-cage, synchronous, and wound-rotor motors for 2300- to 4600-volt service. Known as the Valimitor starter, unit is said to provide unlimited short circuit protection. Manufacturer claims that regardless of the avail-

GRINDING WHEELS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Every Norton product—from Worcester as well as from the Behr-Manning division at Troy—will bear this symbol of Norton quality.

The main Worcester plant of Norton Company—world's largest producer of abrasive products

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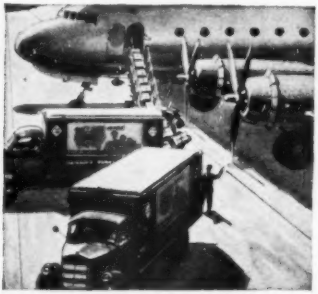
(Behr-Manning, Troy, N. Y. is a Norton Division)

$5.07 saved a contract ...and a man's business

Special switches were needed to complete an electrical instrument contract. Late delivery of finished items would kill chances of future orders and lay off men. Switches were 1100 miles away, but Air Express delivered the 15-lb. package at 3 A.M. — 8 hours after pick-up. Cost, only $5.07. Air Express now used regularly. Keeps down inventory, improves customer service by early delivery.

Low as $5.07 was, remember Air Express rate *included* door-to-door service, receipt for shipment and more protection. It's the world's fastest shipping service that *every* business uses with profit.



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(Same day delivery in both cases if you *ship early.*)

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able kva. of the power system, a fault current in the motor circuit is limited to 25,000 kva. (steady state current) because the magnetic contactor, 50,000 kva. interrupting capacity, is more than ample to clear the circuit. An oil disconnect switch permits isolating the starter from the power lines. Contactor is mounted in the rear oil tank. In the front compartment is mounted the overload relay panel which provides inverse time element protection for prolonged overloads and trips on short circuits.

Starters are built for motors up to 600 horsepower at 2300 and 4600 volts, 60-cycle service. For 25-cycle power circuits, the maximum rating is 300 horsepower at 2300 volts, and 250 horsepower at 4600. The Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland 4.

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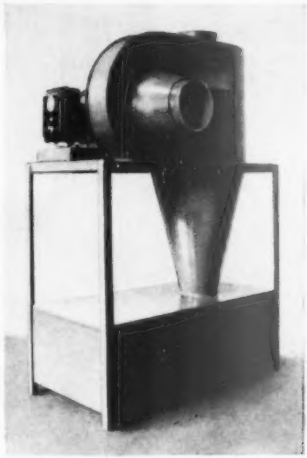


Dust Collector

For handling toxic fumes or dust from cutting, grinding, and other machining operations, either separately or in combination, portable Model 20N30 Dustkop filterless dust collector is self-contained, with a capacity of 2300 c.f.m. Device employs a direct connection from the outlet of the cyclone separator to out-of-doors, so that all fumes and dust are removed from the working space. Dimensions are 22x40x56 inches. Aget-Detroit Co., Main at Washington, 304 Ann Arbor, Mich.

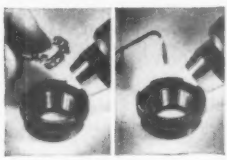
•

85-Watt Fluorescent Lamp

A change in the construction of the T17, 100-watt, 60-in. fluorescent lamp has resulted in a lamp 2⅛ inches in diameter, which consumes only 85 watts of energy when operated with standard 100-watt ballast and auxiliaries. It provides the same amount of light as the 100-watt lamp, burns as long, and has the same maintenance characteristics, according to the manufacturer. Since no changes have been made in physical dimensions, the 85-watt lamps are interchangeable with 100-watt lamps in

BUILT TO BREAK RECORDS FOR LONG LIFE

Now, for the most severe services, you can choose the new Jenkins Fig. 976-A with complete confidence that it will set new economy records. Use it for pressure regulation, bleeds, drips, and drains, or any close regulation of steam that threatens wire drawing. It will lower maintenance, last longer, where entrapped pipe chips, scale, or rust tubercles are a problem.



SMASHED PIPE CHIPS, WIRE, LEAVE NO SCARS

Steel pipe chips and 1/16" wire rod, with Brinell hardness in excess of 300, were crushed between the new Jenkins JX500 Plug and Seat Ring without leaving a scratch or dent. That's proof of super hardness!

Compare Fig. 976-A, part for part, and see why it's as nearly wear-proof, trouble-proof, and maintenance-free as any stock valve can be. Only a few of the dozen ways it's better are shown here. Get the complete story in the new folder. See why it's unrivalled for endurance and economy, —why it's your best buy in plug-type valves! Use coupon.

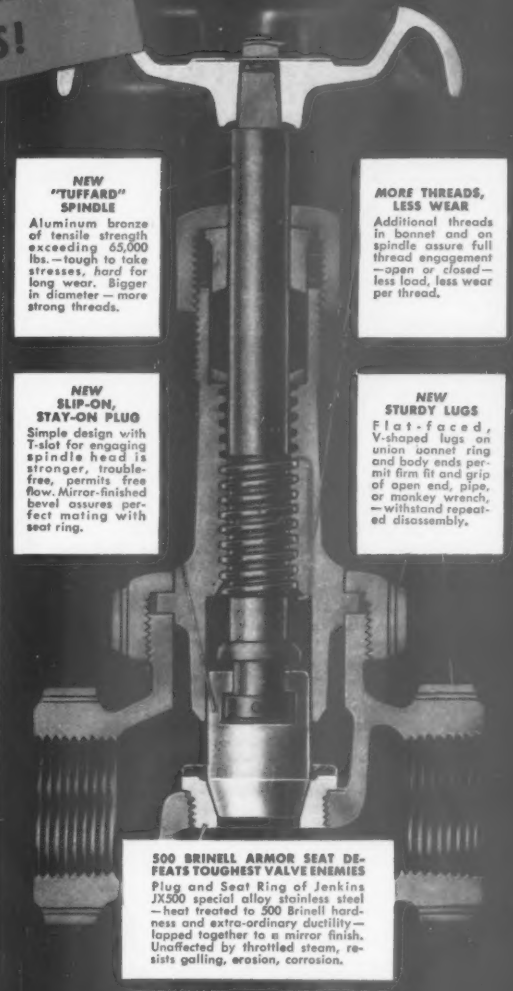
Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

JENKINS Fig. 976-A

PLUG TYPE

Armor Seat

BRONZE GLOBE VALVE



***NEW* "TUFFARD" SPINDLE**

Aluminum bronze of tensile strength exceeding 65,000 lbs.—tough to take stresses, *hard* for long wear. Bigger in diameter—more strong threads.

***MORE* THREADS, LESS WEAR**

Additional threads in bonnet and on spindle assure full thread engagement—open or closed—less load, less wear per thread.

***NEW* SLIP-ON, STAY-ON PLUG**

Simple design with T-slot for engaging spindle head is stronger, trouble-free, permits free flow. Mirror-finished bevel assures perfect mating with seat ring.

***NEW* STURDY LUGS**

Flat-faced, V-shaped lugs on union bonnet ring and body ends permit firm fit and grip of open end, pipe, or monkey wrench, —withstand repeated disassembly.

500 BRINELL ARMOR SEAT DEFEATS TOUGHEST VALVE ENEMIES

Plug and Seat Ring of Jenkins JX500 special alloy stainless steel —heat treated to 500 Brinell hardness and extra-ordinary ductility—lapped together to a mirror finish. Unaffected by throttled steam, resists galling, erosion, corrosion.

300 lbs. Steam 600 lbs. O.W.G.

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"IT LIFTS AND LOWERS AS IT HAULS"

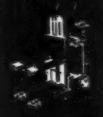
4000 LB. CAPACITY
Telescopic Straddle Type
"JACKSTACKER"

See It At The NATIONAL MATERIALS HANDLING SHOW PHILADELPHIA JAN. 10-14, 1949

"JACKSTACKER"
ELECTRIC TIERING TRUCK

Capacities to 4000 lbs. No Similar Type Truck Carries 4000 lb. Pay Load. Load always over Wheels

- TO MOVE AND STACK UNIT LOADS on all skids and pallets. 4 types: Straddle; Counterweight; Open end Base; Platform.
- Telescopic, High Stacking feature (available all models) allows easy passage under door frames and other obstructions.
- Takes Much Less Room . . . and light dead weight of "JackStacker" makes it ideal where floors will not support Fork Trucks or cramped quarters make them impractical. The "JackStacker" means NARROWER AISLES for you.
- All Controls in Handle Head — 2 speeds forward and reverse, lifting, lowering, horn and lock, plus instant smooth-action electric brake, constantly applied type. Controls operate with handle any position. No need to halt "JackStacker" to raise or lower carriage. No similar type truck has this basic advantage. "It lifts and lowers as it hauls".
- Master Drive Unit, mounted on articulated linkage, gives good traction over ramps, sills, uneven floors. Only takes 20 minutes to change Master Drive Unit assembly.



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all 100-watt fluorescent fixtures. The new model is available in daylight, 4500-deg. white, white, soft white, and Warmtone. Present starter types FS-6, FS-64, and COP-64 will operate either 85- or 100-watt lamps. Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18.

•

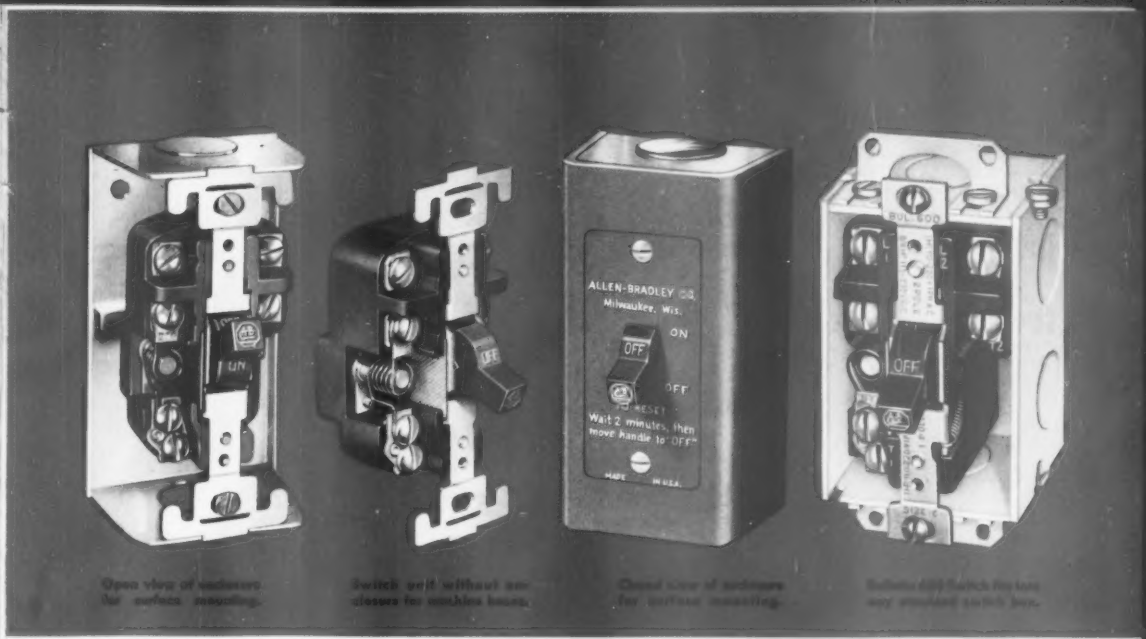
Self-Loading Scoop Truck

Equipped with pneumatic tires and self-loading scoop, line of electric fork trucks is available in 3000- and 4000-lb. capacities. Manufacturer states that the scoop loads itself automatically when driven into a pile of loose material without use of hydraulic cylinders or other auxiliary power; also, that it can self-load 100 per cent of capacity in loose materials and as much as 60 per cent in ceramic clay of high moisture content. When handling abrasive materials, Amsco edging and wear strips are provided on the bottom of the scoop. Loads may be released at any predetermined height by a fixed trigger, or at any height within the lifting range of the truck by a manually operated lever. Designed to provide controlled dumping when necessary, a hydraulic self-actuating cylinder and metering valve are said to permit dumping at any speed. Scoop is mounted on a standard carriage plate, and is interchangeable with standard forks. Crescent Truck Co., Lebanon, Pa.

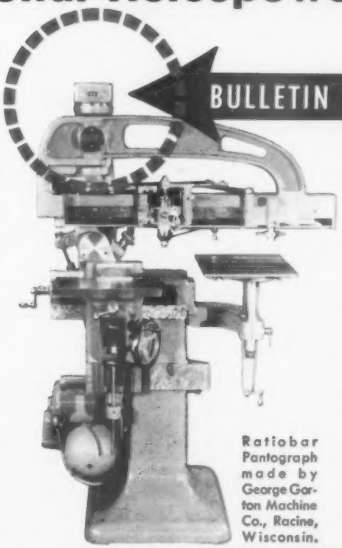
•

Lawn Mower

Heavy-duty power lawn mower that cuts a 24-in. swath is powered with 1½-hp. motor, and, according to manufacturer, will cut from 3½ to 4 acres per day. The 6-in. cutting reel revolves on roller bearings. Five cutting blades are of crucible steel with a flexible bottom blade. Cutting height is adjustable from ¾ to 1¾ inches. Equipped with 15-in.-diameter traction wheels, it has a 3-in. rubber tread. Lever control is op-



Starting Switches with Overload Protection for Fractional Horsepower Motors



Ratiobar Pantograph made by George Garton Machine Co., Racine, Wisconsin.

To satisfy the latest ruling of the National Electrical Code... which requires overload protection for many fractional horsepower motor applications... the Bulletin 600 Starting Switch is the popular answer.

Its self-contained thermal breaker is always dependable. Long periods of inactivity will not affect its accuracy. At the first sustained overload... the switch trips... and the motor is protected against burnout.

Waterproof Enclosure.

The Bulletin 600 Starting Switch cannot be held closed until the overload condition is corrected. This compact control unit is a sales asset to any machine.

Above is shown how easily the Bulletin 600 Fractional Horsepower Starting Switch fits into the standard Allen-Bradley enclosure or into any standard switch box.

The switch unit can also be mounted in any suitable cavity in the machine frame.

For locations requiring enclosures to operate in wet or hazardous locations, there are several standard A-B enclosures to meet every service requirement.

Bulletin 600 Switches are available with pilot lights, selector switches, and other accessories. Send for complete data, today.

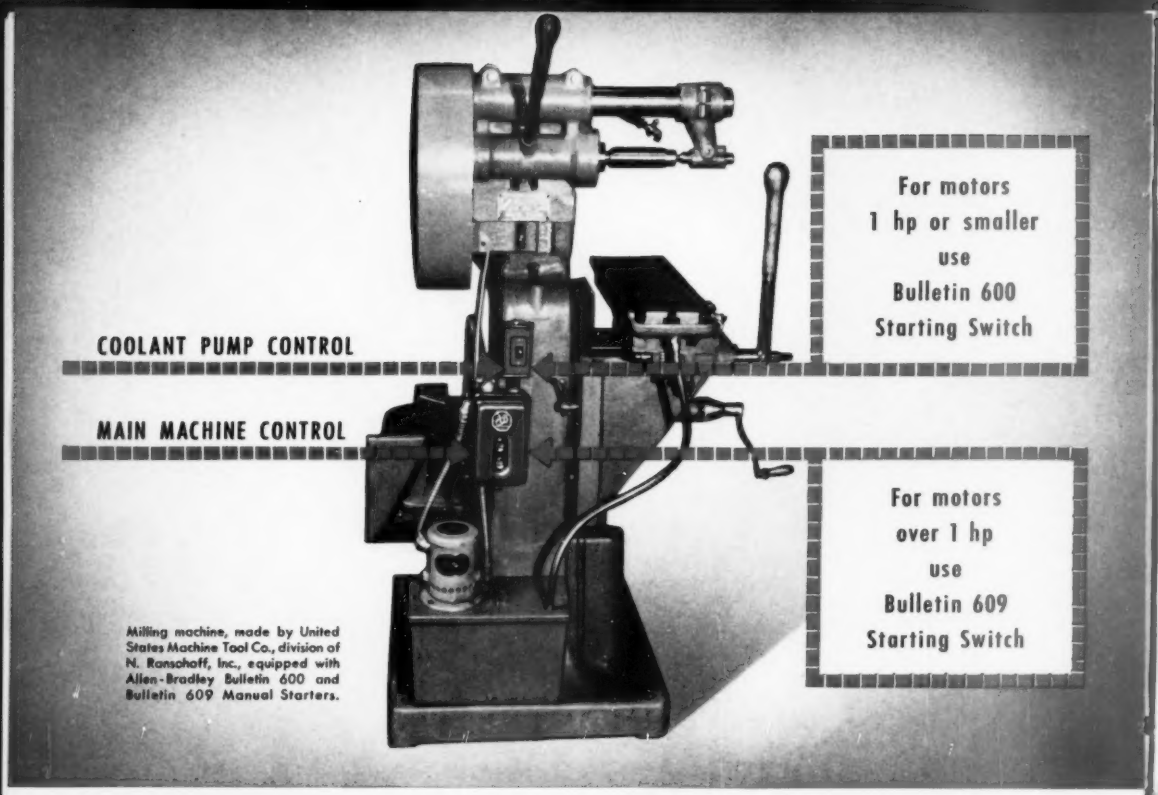
ALLEN-BRADLEY

QUALITY

BULLETIN 600 STARTING SWITCHES

A-B Quality

Allen-Bradley Co.
1316 S. Second Street
Milwaukee 4, Wis.



Milling machine, made by United States Machine Tool Co., division of N. Ranschoff, Inc., equipped with Allen-Bradley Bulletin 600 and Bulletin 609 Manual Starters.

HOW TO PICK THE RIGHT MANUAL STARTER

For Motors of 1 hp or less—Specify the compact Allen-Bradley Bulletin 600 Manual Starting Switch. It is so small that it fits easily into any standard conduit switch box . . . with ample wiring space.

A self-contained thermal overload breaker trips the switch when the motor is overloaded. The switch cannot be reclosed until the overload condition is corrected. A full line of enclosures is available for every service application.

Bulletin 609 Starter in steel enclosure. Note white interior and the ample wiring space.

For Motors of 1-5 hp, 220 v—1-7½ hp, 600 v ular Allen-Bradley Bulletin 609 Manual Starter, available in enclosures for general, waterproof, dust-tight, and hazardous locations.

Quick-make and quick-break silver alloy contacts . . . double overload breakers . . . and handy push-button operation are a few of the assets of this popular manual starter. Available also for mounting in machine bases.

Send for Third Edition of Allen-Bradley Condensed Catalog . . . . just off the press.

Allen-Bradley Co.
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ALLEN-BRADLEY
MANUAL AND AUTOMATIC MOTOR CONTROLS
QUALITY

A-B Quality

erated from the handle bar. Moto-Mower Co., 4600 Woodward Ave., Detroit 1.

•

High-Temperature Immersion Heaters

Multiple-element electric immersion heaters, Type TMO, for high-pressure, high-temperature applications, range in rating from 1 to 100 kw., depending upon the job for which they are needed. The variation is obtained by arranging groups of tubular elements in extra-heavy mounting flanges. The hair-pin-shaped elements of triangular cross-section are welded into heavy forged-steel flanges and are so arranged as to permit liquid to circulate freely.

Units are available in steel, stainless steel, or Inconel sheaths as required for various corrosive liquids. Suitable for preheating air and other gases, and for superheating steam. With special gaskets, the heaters are said to withstand high pressures and to resist leakage when used in heat transfer liquids of high penetration. Edwin L. Wiegand Co., 7518 Thomas Blvd., Pittsburgh.

•

Small Snow Loader

Suitable for use in plant storage and loading areas, Model 522 snow loader is one-man operated and self-feeding, with a capacity of up to 5 cubic yards per minute. It can be converted to a year-around bucket

FREE! ELEVATOR BOOKLET

— a diagram-packed booklet that gives you facts you need to know before "elevatoring" a building where power trucks are to be used. Gives elevator sizes and capacities and practical installation data.

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Serving the industrial needs of America through 257 local offices

Please send Otis Bulletin B-705-R which shows how and where Pow-R-Truck Elevators differ from conventional freight elevators.

Clip and mail to Otis Elevator Company, 260 Eleventh Avenue, New York 1, N. Y.

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Removes 2 TONS of incrusted dirt in less than 8 HOURS!

SEE THIS MACHINE in action at both Metal Shows and at the Natl. Safety Exposition this year.

AN EASY ONE MAN JOB WITH THE

TENNANT INDUSTRIAL FLOOR MACHINE

Pulverizing and shearing thick hard grime from floors at the amazing rate of 8 to 20 lbs. per *minute*, the Tennant Industrial Floor Machine makes a fast, easy job of *any* floor-cleaning assignment, no matter how tough!

Removes hardened tar, grease, dried paint, cement splashes and similar material like magic.

Guaranteed to do the job!

REVO-tool pulverizes and removes thick incrusted grime. Provides over half million impacts per min.

The way to finer floors
TENNANT
Floor Maintenance System

FEATURES

- **REQUIRES ONLY 1 MAN**
- **PICKS UP SOILAGE** as it goes. Eliminates extra sweeping.
- **SMOOTHS AND LEVELS** surface while cleaning. Leaves floor hard, dry, ready for traffic.
- **ELIMINATES CHEMICALS** or need for soap and water.
- **NO INTERFERENCE** with normal plant operations.

Get the facts NOW!

WRITE TODAY for proof of what the Tennant Industrial Floor Machine can do for you. Full-length news story, photos, authentic shop reports, maintenance data—all mailed to you promptly. No obligation.

G. H. TENNANT CO.
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MINNEAPOLIS 11, MINN.

loader for bulk loading applications. Features include automatic overload release, said to protect the machine; floating boom; individual steering and crowding clutches, controlling driving, crowding, and braking; spiral feeding device for capacity loading and breaking up lumps and ice. Barber-Greene Co., Aurora, Ill.

•

Squirrel-Cage Induction Motors

Called Design X, line of low-starting kva. squirrel-cage induction motors is available in flange-mounted type and coupled 2-bearing type for direct coupling to 514, 600, and 720 r.p.m. air compressors. Line is said to permit full-voltage across-the-line starting, with a starting kva. of 425 per cent. Line is available in from 60 to 250 horsepower, at 60-cycle speeds from 514 to 720 r.p.m. Electric Machinery Mfg. Co., Minneapolis 13.

•

Small V-Belt Clutch

Designed for fractional to 2-hp. gasoline engines and electric motors, Model AN V-belt clutch is of a reduced size and features a pulley with a 2-5/16-in. outside diameter for "A" belt drives. Made of steel, it has no frictional elements. Low-starting load torque and equalized belt pressure are said to provide long belt life. V-belt Clutch Co., 3757 Wilshire Blvd., Los Angeles 5.

•

Hard-Surfacing Powder

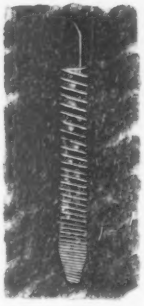
Powder, called Surfaceweld A, applied with a carbon electrode, is used for depositing a thin chromium-carbide-type of hard surface said to be highly resistant to abrasive wear and corrosion. It can be used with an a.c. arc with a single carbon electrode, applied with a twin carbon arc, or may be used with d.c., carbon electrode negative. Designed for sur-

FOR BEST RESULTS USE THE

Udylite BRIGHT ZINC PROCESS

COMPLETE STOCKS OF ALL SUPPLIES—HIGH QUALITY PLATING AT LOW COST

Exclusive Ball Anode Container Saves on Salts



The Udylite Ball Anode Container is specially designed to prevent scrap from dropping to the bottom of the tank. Even the smallest ball anode scraps are kept "in action" until completely used. Thus, the metallic content of the bath is maintained at a uniform level—minimizing costly salt additions.

Udylite Ball Anodes provide a constant, maximum anode area which prevents sludge accumulation. As the anodes are used up, new ones are added at the top.

High-Efficiency Brighteners

Udylite Brightener Agents are highly effective in producing the proper grain refinement for brighter zinc deposits. They are specially prepared to have stability in the plating bath, insuring full effectiveness over a long period. Udylite Brightener Agents are quickly and easily added to the plating bath.

Coast-to-Coast Stocks of Prepared Zinc Salts

Udylite maintains complete stocks of prepared Zinc Salts to fill your needs promptly, and prevent costly delays or process interruptions. Udylite also carries a complete line of platers' supplies—from rubber gloves to anodes, chemicals, and a complete line of plating equipment. All supplies are laboratory tested for your protection.

PIONEER OF A BETTER WAY IN PLATING

Let Us Help You On Any Plating Problem

Remember, Udylite Technical Men are at your service at all times to help you on any plating problem whatever. There is no obligation or cost. If current shortages have necessitated certain changes in your plating operations, our Technical Staff will be glad to study your processes, and make recommendations for top plating efficiency, excellent finishes, fast output, and minimum plating costs. Just address a letter to us, describing your process, and the results you want . . . and let us furnish you with detailed recommendations. Write *today*.

The Udylite

DETROIT 11, MICHIGAN

F.O.B.

with **truck-man** means

FASTER ON BOARD

It's *easier,* too, with this Truck-Man Pallet Toter. Note this 180° turn into a standard seven foot car door with a heavy, bulky load . . . and plenty of room to spare! That's typical Truck-Man maneuverability, designed into all three Truck-Man models to cut your handling costs.

The Model DF Pallet Toter handles pallet loads faster and better because it's *designed* for horizontal pallet movement. Forks of heavy channel steel operate hydraulically, auto primed, with complete control from the driver platform. Weight empty, 920 pounds . . . load rating, 3500 pounds! Brake and clutch work from the same lever. Turns 360° in its own length! Rugged, six inch wide load wheels have rubber inserts for easy riding and quiet operation; dual drive wheels are pneumatic for better traction and easy riding . . . both are "friendly to floors".

All three Truck-Man models powered by the Wisconsin Heavy Duty air-cooled gasoline engine. *All three* give you . . .

- Round-the-clock operation . . . no layups for battery charge . . . no battery charge equipment to buy.
- Economy . . . eight hours work on one gallon of gas.
- U/L approval . . . simplicity—safety—stamina!

"and the operator rides with the load!"

TOP: Model D Skid Lift, over 1½ Ton Rating.
BOTTOM: Model DT, the handy Platform Utility for all 'round plant use.

$850

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Ask Any Operator or the **truck-man** *Distributor in Your Area*

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☐ Hydraulic Skid Lift ☐ Pallet Toter ☐ Platform Utility

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facing applications where the use of hard surfacing electrodes is not practical, such as on thin work, for thin deposits, or for use with small a.c. welders. When mixed with water, the powder forms a paste which adheres to flat and curved surfaces. Applications for the powder form of hard surfacing are such jobs as maintaining a cutting edge of mixing blades, drill bits, forming dies, scraper blades, and other equipment. Available in 1-lb. cans. The Lincoln Electric Co., Cleveland.

•

Pallet Rack

Portable rack for stacking palletized materials is available in standard and heavy-duty models. Tiering of pallet loads to ceiling height on these racks, so that low-level materials are not tied up, is said to permit order-taking lines to be shortened and a greater variety of reserve stocks to be stored in one bay. The racks are installed by spotting them in place with fork trucks, with no welding or cutting necessary. Rack levels can be raised to accommodate high loads by the use of removable extension posts. Equipment Mfg. Co., Inc., 21550 Hoover Road, Detroit 5.

•

Ring Packing

Designed to eliminate the damaging effects of extrusion of packing material into the clearance space between the mating parts, ring packing, designated the Palmetto G-T, is suitable for use as a seal in cylinders, swivel joints, struts, and other applications where pressures may be considerably above current practices. Packing consists of a sealing ring of synthetic rubber in a T-section backed up on each side by two non-extrusion ring retainers or guards of laminated phenolic material. Synthetic rubber member is under slight compression, which provides the static seal. Packing is suitable for use in hydraulic or pneumatic systems where a positive seal is necessary; as a static seal where there is constant or impulse pressure; and in systems where there is reciprocating motion with either constant or impulse pres-

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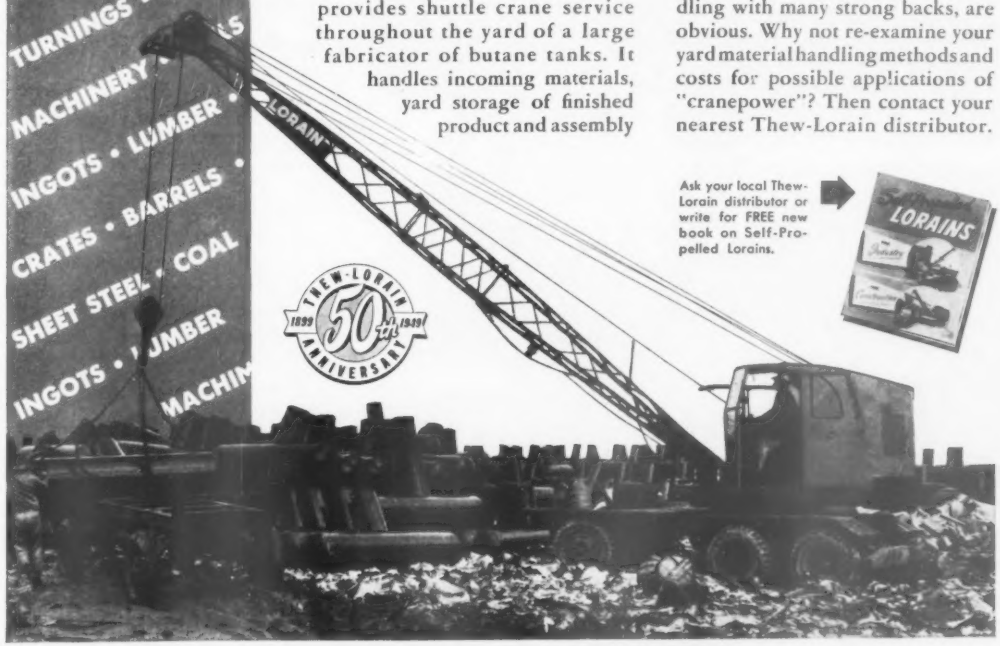
CRANE-HANDLING *versus* MAN-HANDLING *can save you money*

LOWER production costs can start right in your own back yard with the installation of a versatile Lorain Crane. This self-propelled, rubber-tire mounted TL-20 provides shuttle crane service throughout the yard of a large fabricator of butane tanks. It handles incoming materials, yard storage of finished product and assembly of orders for final shipment.

The time and dollar savings of crane-handling on this job with one Lorain, one operator and a ground man, as against man-handling with many strong backs, are obvious. Why not re-examine your yard material handling methods and costs for possible applications of "cranepower"? Then contact your nearest Thew-Lorain distributor.

Ask your local Thew-Lorain distributor or write for FREE new book on Self-Propelled Lorains.



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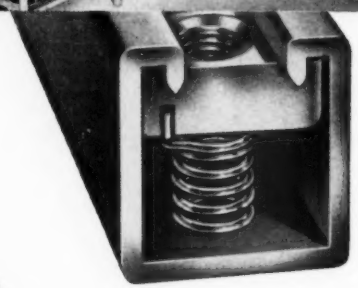
THE THEW SHOVEL CO.
LORAIN, OHIO

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

SPEAKING OF STRENGTH WITHOUT BULK

Adjustable Unistrut Die Racks are simple to assemble and capable of supporting tremendous weights. Here tons of metal dies, over 10,000 of them, are stored on this 110 ft. Die Rack.



They did it with "UNISTRUT" ALL-PURPOSE METAL FRAMING

You also can quickly, easily and economically build all types of shelving, framing, supports, mounts, racks, tables and benches—pipe and cable hangers, fluorescent fixture supports — and many other structures with only a hacksaw and wrench.

Here's real "strength without bulk." Completely adjustable and reusable Unistrut is steel channel with a continuous slot. You simply insert the Unistrut spring nut at approximate point where you wish to attach another framing member, slide to exact position, bolt and tighten. No drilling or welding required.

ALL PURPOSE UNISTRUT METAL FRAMING

Unistrut gives flexibility and installation advantages that can't be attained by old-fashioned methods of frame construction.

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sure. Temperature range is from —70 to +250 degrees F. It is claimed that packings will not leak or fail over extended periods of operation with pressures anywhere from 0 to 3000 p.s.i. Packing is available in external or piston type seal or internal or rod-type seal. Greene, Tweed & Co., North Wales, Pa.

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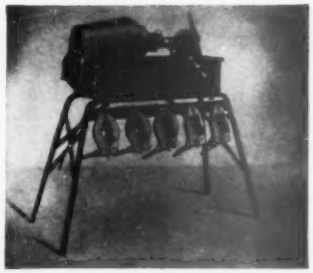

Pipe Threading Machine

High-speed pipe threading machine, Model 3A, is built with switch-controlled automatic chuck that grips and centers the pipe. Machine is equipped with six quick-opening die heads which range from ½ to 2 inches. Each head contains its own dies, resulting in fewer sharpenings of the dies, manufacturer says.

One screw adjusts all dies simultaneously for changing depth of thread. Each head is equipped with a burring device which reams the pipe as the head is threading. Heavy-duty motor is ½ horsepower, 115 volts, universal current, any cycle. Power unit is ball-bearing equipped, with helical gears which are said to automatically select the proper cutting speed. Quijada Tool Co., Inc., 5474 Alhambra Ave., Los Angles 32.

•

Automatic Hot Water Air Valve

Said to eliminate air from convectors, radiators, mains, baseboard radiators, and panel heating units, automatic hot water air valve, No. 20, requires no preliminary soaking, according to its maker. Applications include both forced circulation and gravity circulation systems, and manufacturer states that it is designed to work on both new and existing heating plants. Setting may be adjusted with either a coin or a screwdriver. A selector screw permits choice of three different functions: Fully automatic air eliminator; a manual shut-off; or manual venting. The Dole Valve Co., 1933 Carroll Ave., Chicago 12.

•

Cold Cathode Slim Lamp

Featuring a cloverleaf single-pin base, cold cathode slim lamp, No. 96T8, may be used in standard slimline-type luminaries. It is instant starting, suitable for operating currents up to 200 milliamperes, and is available in all regular fluorescent lamp colors. Life of lamp is said to be in excess of 10,000 hours, unaffected by the number of starts.

● You can always depend on your Spang CW Pipe Distributor for a square deal. He prides himself on making no under-the-counter deals. And whenever he gets pipe, you can be sure that you will get a fair share of it.

Just as your Spang Distributor is backing up your efforts, we are backing up his. We are trying to produce more and more Spang CW. In spite of this, we are unable to keep pace with the tremendous demand for pipe.

Keep in touch with your Spang CW Pipe Distributor. Place your orders as far in advance as possible. That way you can help your distributor to help you get pipe on the job on time.

SPANG-CHALFANT

Division of The National Supply Company

EXECUTIVE OFFICES: PITTSBURGH, PA.

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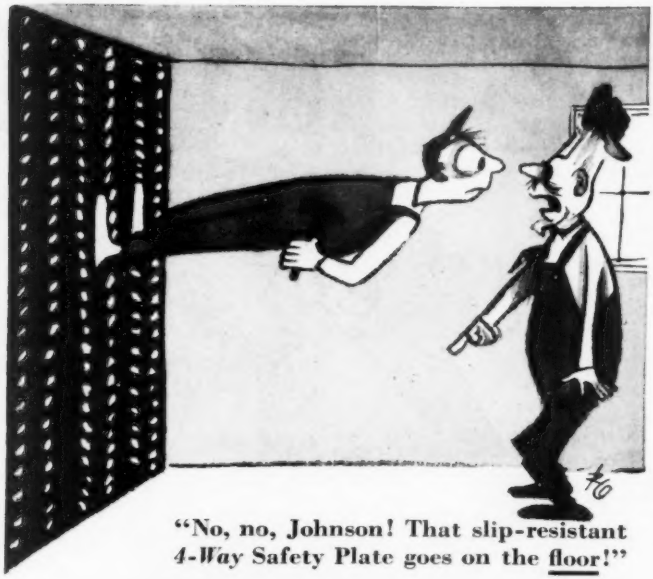
SPANG

QUALITY *that is recognized wherever pipe is used*



"No, no, Johnson! That slip-resistant *4-Way* Safety Plate goes on the floor!"

Slip-resistant? Yes, Inland 4-WAY Safety Plate provides *positive* traction wherever feet or wheels must go . . . floors, walkways, ramps, platforms, steps—in your plant or on your products. What's more, it is easy to install, easy to maintain. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill.

WRITE FOR BOOKLET

Inland 4-WAY* SAFETY PLATE

STOCKED BY LEADING STEEL WAREHOUSES

*Reg. U. S. Pat. Off.

Special shapes and designs to fit individual requirements are also available. Catho-Lite Co., Inc., 4122 West Belvidere Ave., Baltimore 15.

•

Work Gloves

Heavy-duty gloves for handling small castings, rough stock, grinding, and similar work are made of chrome-tanned cowhide and have a canvas back fitted with elastic straps to lessen hand fatigue and provide a snug fit. Seams are steel sewed, and the seam along the fore-finger has been eliminated. Wearing surface of the palm has been increased by extending it, and there is no bib patch. Steel-stapled strap at the palm crotch and a steel-stapled patch on the face of the thumb are intended to fortify these parts of the glove. The wrist is finished with a short cuff with tape binding. American Optical Co., Southbridge, Mass.

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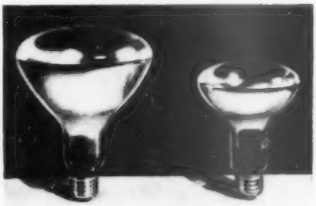

Small-Size Spot, Flood Lamps

For use in spaces too restricted for the R-40 and PAR-38 lamps, which have reflectors 5 and $4\frac{3}{4}$ inches in diameter respectively, small 75-watt R-30 spot lamp and a flood lamp of the same size have a $3\frac{3}{4}$-in.-diameter reflector. Manufacturer states that small size of lamps permits the design of smaller individual holders and housings. They have a rated life of 1000 burning hours, according to the maker. Illustration shows the R-30 spot lamp, on the right, as compared with the standard R-40. General Electric Co., Lamp Department, Cleveland.

•

Combination Separator Trap

Semi-steel combination separator trap, Series 430, is designed to remove entrained moisture and condensate from air supply lines. Moisture is diverted to collecting chamber where an integral ball float trap

Safe, Swift Handling Pays Dividends!

● Yes, with finger-tip precision, one man masters ponderous loads — lifting, lowering, transporting, stacking — from any point to any other in the area served by a Trav-Lift Crane. *And all without rehandling.* With P&H variable speed push-button control you have the power, speed and versatility that pays real profits in time and money saved.

Rugged design, rigid welded construction and especially designed electrical equipment assures you of safe, dependable service for many years to come. Built by America's leading producer of overhead materials handling equipment.

Where your service requirements do not warrant investment in a heavy duty crane, the P&H Trav-Lift is the answer. Ask us to send Bulletin H-13-1.

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ELECTRIC HOISTS

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ELECTRIC CRANES · EXCAVATORS · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

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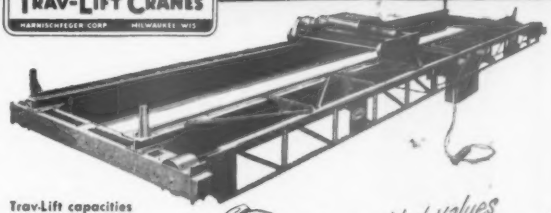
TRAV-LIFT CRANES

HARNISCHFEGER CORP MILWAUKEE WIS



Trav-Lift capacities run up to 15 tons.

These added values protect your investment

VARIABLE SPEED FULL MAGNETIC CONTROL provides 5 distinct steps for all motions; controlled from pendant push-button or from operator's cab.

SAFE — Only 110 volts at the push-button when floor-controlled. Start-stop main line contactor, disconnect switch, thermal overload protection, magnetic limit switch and powerful brakes assure maximum safety.

ALL-WELDED BRIDGE AND TROLLEY incorporates the most important factors in reliable service — rigidity, safety, accessibility.

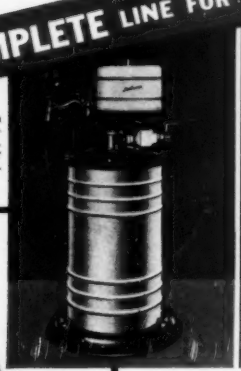
LIFE-TIME CONSTRUCTION — Motors designed specifically for crane service — high starting torque, frequent reversal, etc. Shaved gears, grease sealed anti-friction bearings throughout.

COMPETENT ENGINEERING SERVICE — P&H materials handling engineers will gladly bring their years of experience to bear on your particular problems. Write us.

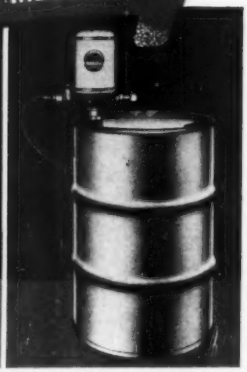
Handle it "thru-the-air" at lower cost

ARO *Saves Time and Labor for You... with Fast, Clean Handling of Lubricants!*

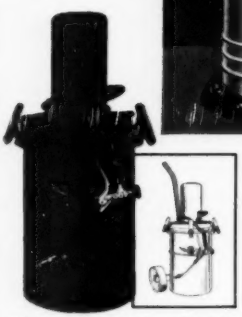
A COMPLETE LINE FOR INDUSTRY



Model 51-DX twin cylinder High Pressure Lubricator . . . air-powered . . . for use with 100 lb. drums.

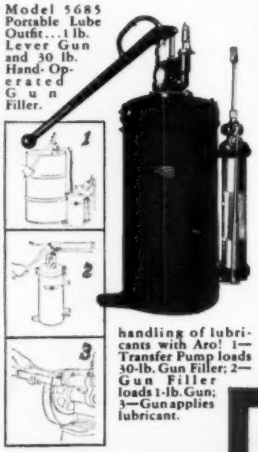


Model 458-E Air-Powered Pump . . . low pressure . . . for Bungtype drums of 400 lbs. or less.



Model 5690 Air-Powered Lubricator . . . available with two-wheel Hand Truck or dolly for easy portability.

Model 5685 Portable Lube Outfit . . . 1 lb. Lever Gun and 30 lb. Hand-Operated Gun Filler.



handling of lubricants with Aro! 1—Transfer Pump loads 30-lb. Gun Filler; 2—Gun Filler loads 1-lb. Gun; 3—Gun applies lubricant.

● More production time for your machines — and lower maintenance costs—with ARO Lubricating Equipment throughout your plant! A complete line for your needs in specialized lubrication — any type of machinery or equipment. Each Aro unit expertly engineered . . . assures fast, clean handling of lubricants from drum to fitting . . . positive lubrication . . . with less labor, less waste, lower cost! A few items in the Aro line shown here. See your Aro Jobber or write . . . The Aro Equipment Corp., Bryan, Ohio.

ARO

LUBRICATING EQUIPMENT

Also—AIR TOOLS . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

automatically discharges it into a drain. Manufacturer states that pressure drop through the separator is negligible. Furnished in five sizes: ½, ¾, 1, 1¼, and 1½ inches, for working pressures up to 150 p.s.i. on the ½- and ¾-in. sizes, and up to 200 p.s.i., on the 1-, 1¼-, and 1½-in. sizes. Suitable for use with air-operated tools, paint spray booths, process work, and similar operations, as well as on steam and gas lines. The Clark Manufacturing Co., 1830 East 38th St., Cleveland 14.

●

Control for Feeding Mechanisms

Device, called Power-Check, is designed to automatically retard speed and ease pressure at any or all points of feed travel, according to manufacturer. It may be nose-mounted through a bracket attached to the moving element of any feeding mechanism, such as pneumatic or manual drill presses, milling or grinding machines, and similar equipment. Controller consists of a hydraulic oil cylinder and an operating rod on which fittings are spaced and preadjusted during the setting-up of the machine to provide a retarding pull up to 1000 pounds, with a safety factor of another 1000 pounds. Heavy-duty units are also available. Installation may be made at any control points of feed travel. Strength of pull is regulated by an external setting, protected by cap. Movement of the feed mechanism actuates the controller. Units are available with 2-, 3-, 4-, or 6-in. stroke; other lengths may be obtained on order. It is claimed that the device automatically compensates for inequalities in the hardness of stock at the work face or at any point of penetration, reducing tool breakage and eliminating scrap produced by excessive pressure upon breakthrough. National Pneumatic Co., Industrial Div., Rahway, N. J.

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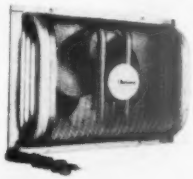


Adjustable Panel-Type Window Fan

Portable, direct drive window fan, equipped with extension cord and 3-speed switch, is available in 16- and 20-in. models. Panels fit window openings from 25 to 36 inches. The 16-in. fan delivers 1550 c.f.m., the 20-in. model, 2100 c.f.m. Both are equipped with a 1/15-hp. motor. The

WHEN WELDING IGNITRONS NEED REPLACEMENT

THE BEST COSTS THE LEAST

. . . on every value count, including long tube life to s-t-r-e-t-c-h your dollars invested — tube dependability to support high welder output!

"THE BEST SERVICE—YOU GET THAT TOO WITH GENERAL ELECTRIC IGNITRONS! SAME-DAY—OFTEN SAME-HOUR—DELIVERY TO YOUR PLANT WHENEVER YOU MUST HAVE TUBES FAST."

FOR your money's worth *plus* . . . phone your local G-E tube distributor or dealer, next time you're in the market for new tubes for welders! The *plus* stands for superior performance—assured because G-E ignitrons, before you install them, already have proved themselves in tests that match the most rigorous service the tubes will encounter.

Prior to manufacture and testing came sound G-E tube design, accenting those details which make for strength, for endurance. Example 1, sturdy stainless-steel water-jackets, resisting corrosion. Example 2, the strong fernico metal-to-glass seal that both bonds and insulates ignitor and steel envelope.

Next . . . all component materials were analyzed for quality and stamina. With manufacture, went step-by-step assembly inspections, in line with the rule that every tube must be built to the same high standards. All this *before* performance tests were begun to make sure the ignitrons would give, reliably, the long service under tough operating conditions expected of them.

Protect your tube investment—protect the high-level production you must have from your welders — by buying G-E ignitrons! Your source is convenient, fast, and responsible: your nearby G-E tube distributor or dealer. He has the right types in stock; is anxious to serve you well. *Electronics Department, General Electric Company, Schenectady 5, New York.*

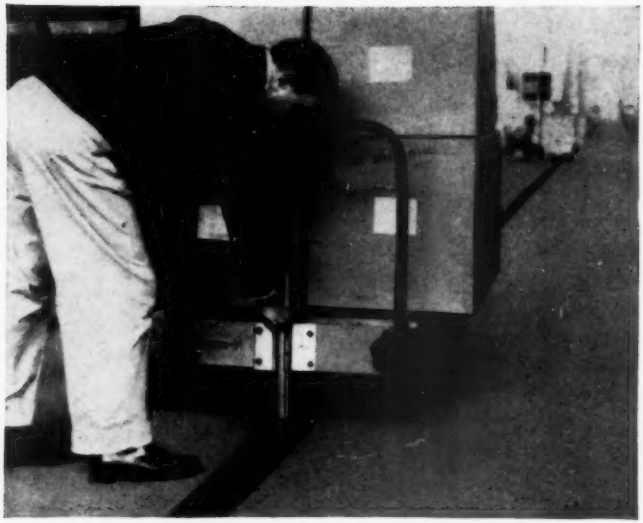
GL-5551/FG-271 IGNITRON

Husky water-cooled tube which opens and closes the main welding circuit. Max kva demand 600, with average anode current 30.2 amp—max average current 56 amp, with kva demand 200. One of a group of well-known G-E ignitrons that range widely in ratings, to meet all needs for this tube in control work and power rectification.

You can put your confidence in—

GENERAL ELECTRIC

190-HA26-8850



WEBB *Towveyor*

FLOOR TYPE TOW CONVEYOR

- ***FAST***—**Operator Drops Pin In Slot, Walks Away . . . No Loading Time Lost.**
- ***CLEAR FLOOR***—**No Obstacles . . . You Can Truck Over It Easily.**
- ***FLEXIBLE***—**Can Be Routed As Required . . . Disengaged Anywhere Along The Route.**

The Webb Floor Tow Conveyor is a new type chain conveyor running in a slot below the floor. Standard shop or warehouse trucks, either 2 or 4 wheel are used. The simple towing pin mechanism is bolted to the front end. Uncomplicated, easy to operate. No overhead structure to interfere with floor traffic.

From the time of its founding, 30 years ago, Jervis B. Webb Company has been identified with improvements in all types of conveyors and has pioneered many of them. Webb Overhead Trolley Conveyors, Power and Free Conveyors, Slat, Drag Chain, Belt, Roller and Portable conveyors are reducing costs, speeding production in thousands of plants and warehouses.

3192

JERVIS B. WEBB COMPANY

Conveyor Engineers and Manufacturers

8951 ALPINE AVENUE • DETROIT 4, MICHIGAN

Offices in Principal Cities

3-speed control is said to provide air in varying volumes. Chelsea Fan & Blower Co., Inc., 1206 Grove St., Irvington, N.J.

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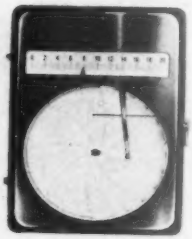

Time-In-Process Recorder

Instrument for recording time-in-process provides a reading on a uniform scale and chart of rate of conveyor movement, directly in terms of the total time consumed by work in traveling through a process. Manufacturer states that no calculations are required when using the device to establish correct conveyor speed for the desired time-in-process for a given product, and that errors are thus eliminated. Device is suitable for use on such equipment as continuous furnaces for metal annealing, tempering, and hardening; continuous drying and baking ovens; continuous ceramic kilns; and continuous glass leirs. The Bristol Co., Waterbury 91, Conn.

•

Cutting Tools

Line of cutting tools, called Hand-Klip, includes a shear cutter, for cutting steel strapping, wire stay, and box wire; a wire cutter, for soft wires, rods, and ¼-in. bolts; and an angle cutter, for close cutting of Cotter pins, rods, bolts, and similar work. Jaws of all three tools may be adjusted to retain correct tension for varying types of work. Pressed steel handles, covered with red plastic that is said to be unaffected by weather or water, are curved to fit the hand. The tools are all eight inches long; the shear cutter weighs 14 ounces, the other two, 13 ounces. H. K. Porter, Inc., Somerville 43, Mass.

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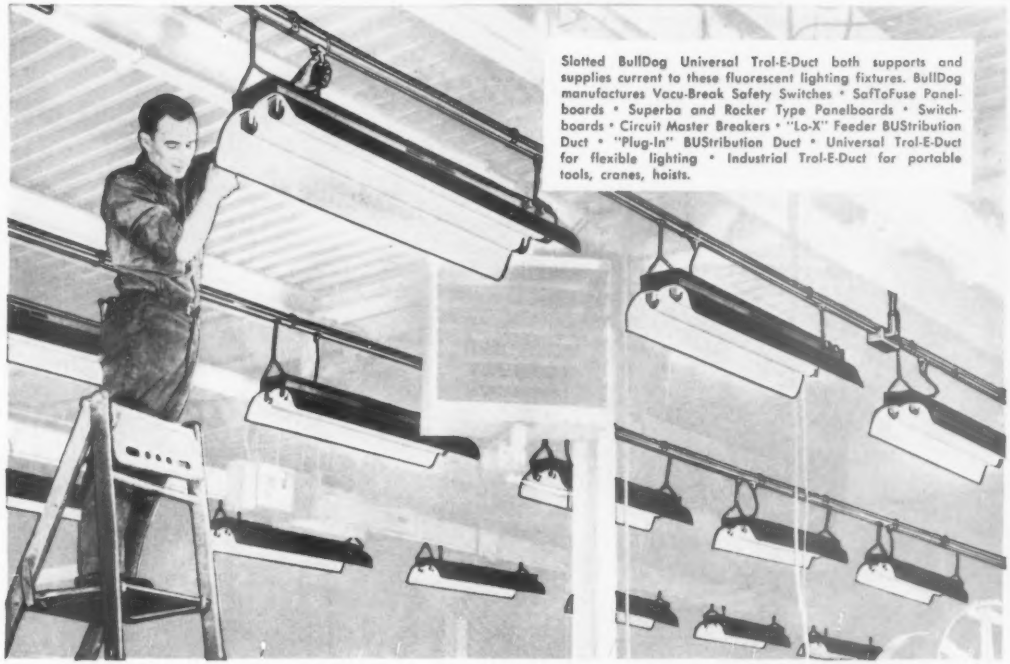
Protective Coating

A sprayable coating for finishing monolithic, concrete, brick, or block construction walls can be used direct-



Slotted BullDog Universal Trol-E-Duct both supports and supplies current to these fluorescent lighting fixtures. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panelboards • Superba and Rocker Type Panelboards • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution Duct • "Plug-In" BUStribution Duct • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes, hoists.

Spot your lighting with a slot

TIRED of rewiring the whole plant every time you move or add a lighting fixture?

Let the continuous outlet *slot* of BullDog Universal Trol-E-Duct spot your lighting fixtures where you want them.

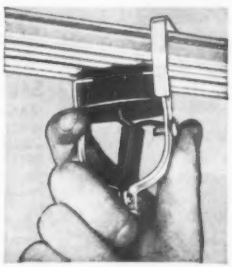
Universal Trol-E-Duct gives truly *flexible* lighting. Trol-E-Duct's slot makes it possible to add, remove or change lighting fixtures at will . . . without rewiring.

Twist-out plugs or trolleys tap current from the slotted opening which runs the full length of the Trol-E-Duct. They can be quickly attached or removed without disconnecting the current.

Prefabricated and standardized, Universal Trol-E-Duct is made in lengths from one to ten feet. It can be dismantled and reinstalled at any time, without scrapping a single part. Systems can be easily expanded by adding standard sections and fittings. Capacity: 50 Amps., 250 Volts, Single Phase.

Call in your BullDog Field Engineer for more information on this modern lighting system. He will be glad to show you a typical installation nearby.

For a mobile light source, use a trolley outlet. Easily inserted at a Trolley Entrance Coupling. Metal wheels roll smoothly astride duct slot. Contacts are in constant touch with bus bars as trolley moves.



Inserting a twist-out plug in Universal Trol-E-Duct is easy! Simply insert plug contacts in slotted opening of duct and give plug a quarter-turn. "L" supports lock plug firmly in place.

BullDog Field Engineers welcome the opportunity to sit in with you during the early planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation costs, as well as efficiency and reliability in actual operation. Why not take advantage of this service?

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

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KESTER SOLDER

ly on inside or outside wall surfaces and on ceilings. Called "Scotch-Top" plastic wall covering, the compound is said to provide both color and texture in a single spraying operation. Manufacturer says that it resists scuffing, grease, oil, water, sunlight, and exposure to weather. It can be sprayed over a waterproofing compound to prevent condensation and to block the passage of moisture. It can be used with sprayable insulation compounds to afford a barrier against heat and cold. Available in white and 12 different shades of green, red, and yellow. It can be washed with soap and water, or with common detergents, including trisodium phosphate. Coverage varies from 5 to 12 square feet per pound, depending on the type of job. It can be applied in varying thicknesses from a thin film to a ½-in. coating or more. Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6.

•

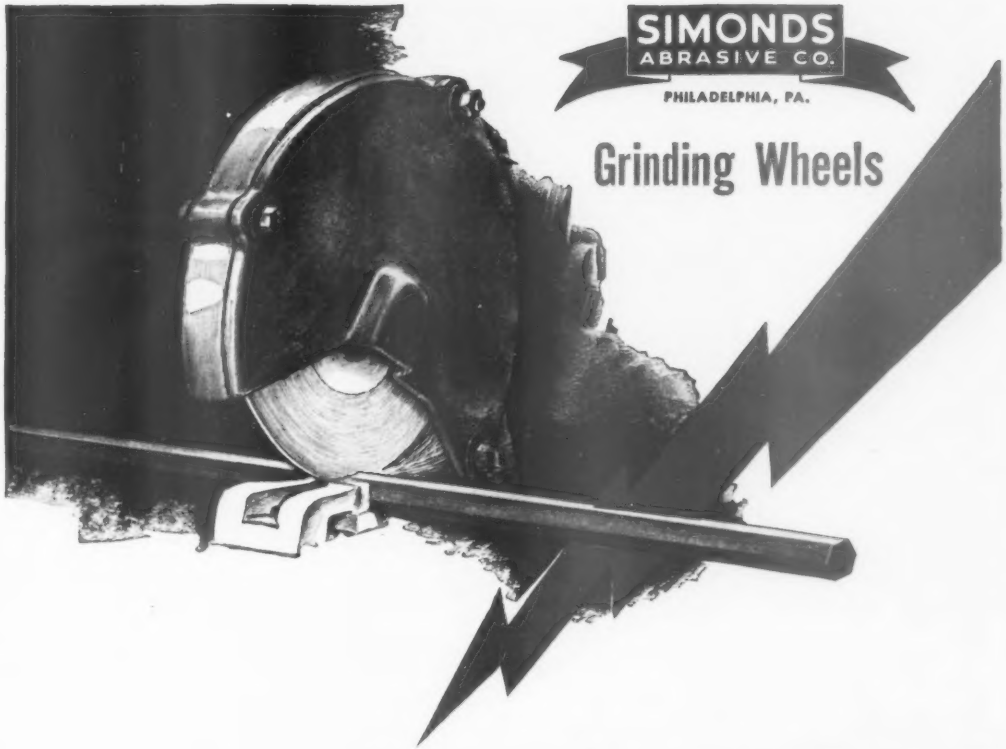
Metal Shear

Line of 16-gage-capacity foot-squaring shears is fabricated from steel. The bed, a rigid one-piece weldment, and the deep crosshead which is guided in flat bronze ways, are said to give a solid non-deflecting support to the knives for accurate, clean cuts. Long crosshead counterbalance springs, concealed behind the panel housings, are said to provide balanced action of the shear. A holddown, available on the 36-in. and longer shears, permits unobstructed visibility of the cutting line. Large, torsion-resisting cross shaft provides equal motion on each end of the crosshead regardless of where pressure is applied to the full-length non-slip foot treadle. Available in 30-, 36-, 42-, and 51-in. widths. Niagara Machine & Tool Works, Buffalo 11, N. Y.

•

Stud Puller

Manufacturer states that no collets, wedges, or other parts are needed to adjust stud puller to different sizes of studs within the range of ¼ to ½ inch. To operate, the knurled collar is turned to In for replacing or Out for removing, and slipped over the stud. A ½-in. square drive handle is then inserted, and pulling pressure applied. The three jaws of the tool automatically close to stud size, and grip when this pressure is applied; they release when pressure is removed. This is said to provide a ratchet action for operation in close quarters. Since the grip is in the center, the tool turns on center,



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ABRASIVE CO.
PHILADELPHIA, PA.

Grinding Wheels

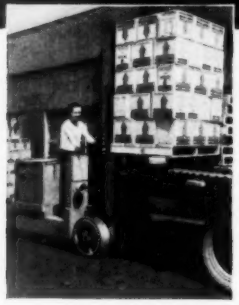
How fast is fast?

With Simonds Abrasive Wheels the answer is not merely in revolutions per minute . . . but in maximum efficiency per revolution . . . top production per operation . . . greater economy per wheel dollar . . . longer service per wheel.

The answer also lies in selective scope and availability—and Simonds Abrasive offers you both—a line of grinding wheels in every desired combination of grain, grade and size, plus a distributor service constantly geared to your requirements.

Let's send you the name of your nearby distributor and a copy of our Data Book describing Simonds Abrasive Company's complete line.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES



Same 4000 lb. *unit* load handling is carried through "over-the-road" operations.

Large Winery* Turns to Mercury's 38 Years Handling Experience

Simplified, faster handling . . . at lower cost. These were the results accomplished with a fleet of Mercury "Yak" fork trucks, selected after study of available designs and examination of other installations.

Success of this Mercury installation typifies the economies available through Mercury's 38 years' experience. For on-the-spot consultation, ask a Mercury Sales Engineer to call. Or write for details.

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TRACTORS • TRAILERS • LIFT TRUCKS

and a 2⅜-in. face will turn in just that diameter, claims the maker, who states that the tool will operate on either long or short studs, with only a ½-in. protrusion of the stud needed. Tool is 3½ inches high, but longer studs can run out of the handle hole, and the stud puller turned with an open-end wrench by means of a 1-in. hex milled on the top. Snap-on Tools Corp., Kenosha, Wis.

•

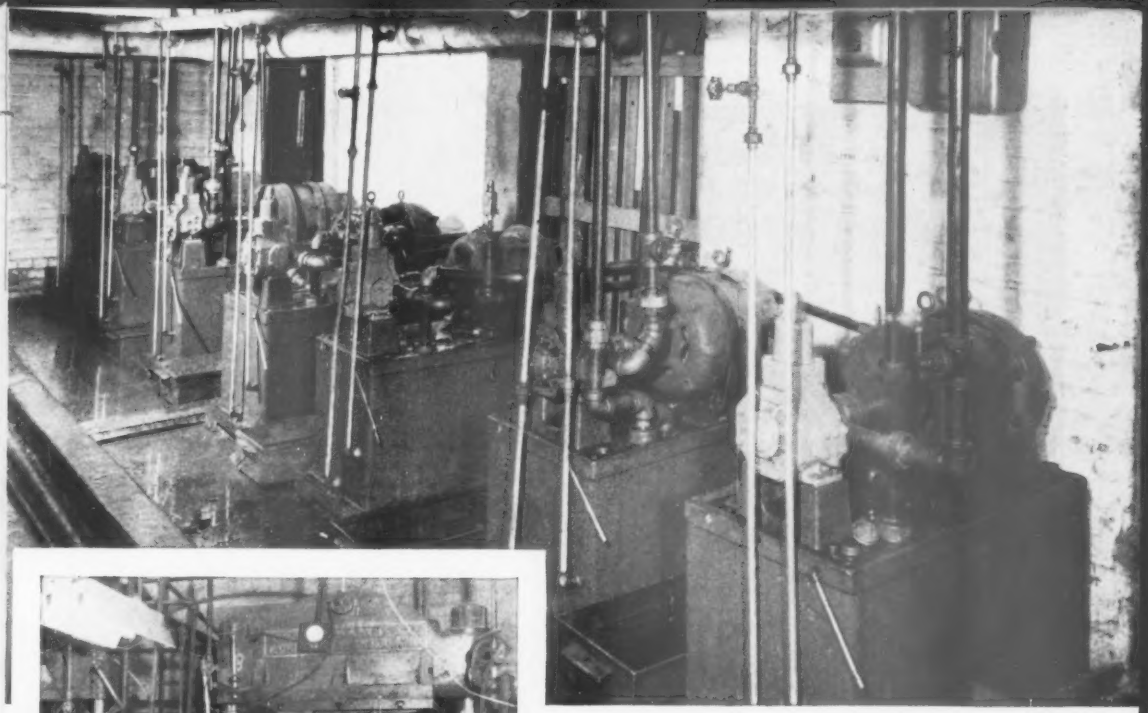
Tube-Type High-Frequency Heating Unit

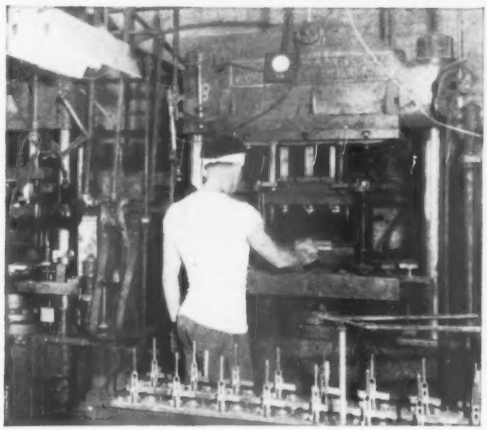
Suitable for heating non-ferrous and ferrous materials to any desired temperature, vacuum-tube high-frequency heating unit, 20 kw., can be used for hardening, soldering, brazing, or melting. Housed in an all-steel cabinet, the unit has heavy-duty vacuum tubes, as well as grounded load coils, and permits use of flexible or rigid leads up to eight feet in length. The machine consumes one g.p.m. when idling, and less than five gallons at full load. The vacuum-tube unit may be adjusted easily to any load, according to manufacturer, and requires no matching transformers or condensers. Lepel High Frequency Laboratories, Inc., 39 West 60th St., New York.

•

Weld Hammer With Wire Cleaning Brush

Handle of weld cleaning tool, called Multi-Pie, contains a cavity that holds wire brush for removing loosened slag, oxides, and rust from welded parts. The cleaning hammer itself is made with five separate pick-pointed tool steel heads. Because they are designed with a free-floating action, the heads all strike with equal force, but adjust to varying contours of convex weld heads,





Stanoil 95 Industrial Oil

Are your hydraulic operations as free of trouble as this?

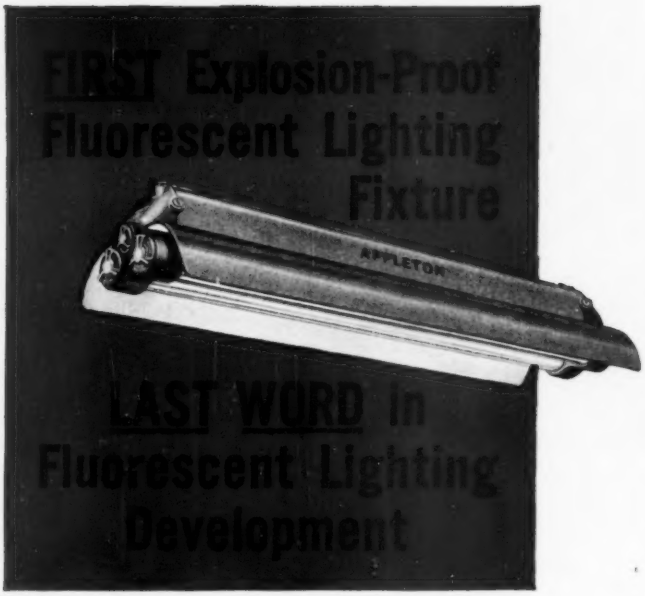
THE HYDRAULIC UNITS shown above are used for the operation of plastic-moulding presses in a midwest plant. Hydraulic oil pressures reach 2500 psi. Oil temperatures average between 120° and 130° F. Presses, operating on a three-shift basis, require 24-hour operation of the hydraulic units.

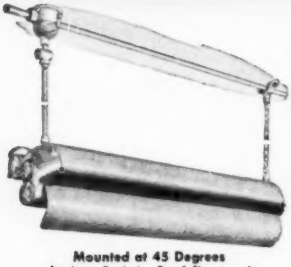
Stanoil 95 has been used as the hydraulic medium in these units for well over a year. During this period of hard, continuous service, the hydraulic oil systems have required no cleaning. No oil changes have been necessary. Hydraulic controls have functioned smoothly.

How does this hydraulic oil performance compare with that in your plant? If you are experiencing trouble with oil deposits, oil deterioration, or oil foaming, you can benefit by changing to Stanoil. This multi-purpose industrial oil contains an oxidation inhibitor and an anti-foam additive that contribute to long oil life and clean, reliable operation of hydraulic units, speed reducers, and circulating systems.

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Oil Lubrication Engineer nearest you.

STANDARD OIL COMPANY (INDIANA) STANDARD





Mounted at 45 Degrees
Appleton Explosion-Proof Fluorescent Lighting Fixtures may be hung at an angle of 45 degrees, adapting them especially for lighting panel boards, meters and gauges, and for use adjoining paint or lacquer spray booths.

Complete Flexibility
All Appleton Explosion-Proof Fixtures may be mounted more than 12 inches below the conduit line, in conformance with the 1947 National Electrical Code, Article 500, with the Appleton Type "ESS" and Type "ESD" Swivels.

The fixture that points the way in explosion-proof fluorescent lighting—the Appleton Type "EFU." First of its kind ever to be developed, its combined safety and service features are foremost in the design and development of fluorescent lighting for hazardous locations.

Type "EFU" complies with the requirements of Class I, Groups C and D; and Class II, Groups E, F and G, hazardous locations. It may be hung straight, in the conventional manner, or at an angle of 45 degrees.

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CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

concave weld filets, or other irregular surfaces, claims the manufacturer. The handle is of aluminum alloy, and the wire brush of crimped oil-hardened wire. As the brush wears down, another section may be drawn out. There are five such sections in each brush, and new brushes, packed three in a box, are available. Picks may be resharpened on a grinding wheel. Bernard Welding Equipment Co., 741-743 East 71st St., Chicago 19.

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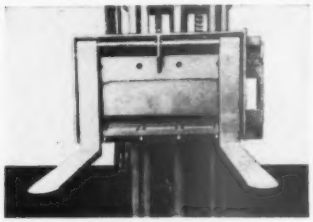

Side-Shifting Fork Truck Attachment

For use on the carriage of any of manufacturer's power fork trucks, side-shifting attachment is controlled by a hydraulically operated deadman-type lever, located on the operator's cab. The forks can be shifted and held by as much as four inches to the right or left of center position, permitting a total travel of eight inches. The movable portion of the carriage is mounted on 12 hardened alloy steel roller bearings to take horizontal and vertical thrusts. Adjustable flow valves on the carriage control the speed of the side shifting. Hydraulic lines are mounted with double take-up sheaves, said to provide proper tension of the lines at all points within full lifting range of the carriage. Lewis-Shepard Products, Inc., 281 Walnut St., Watertown 72, Mass.

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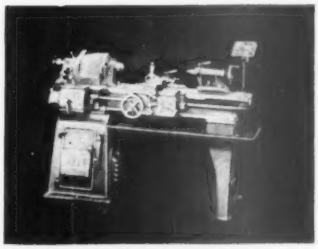
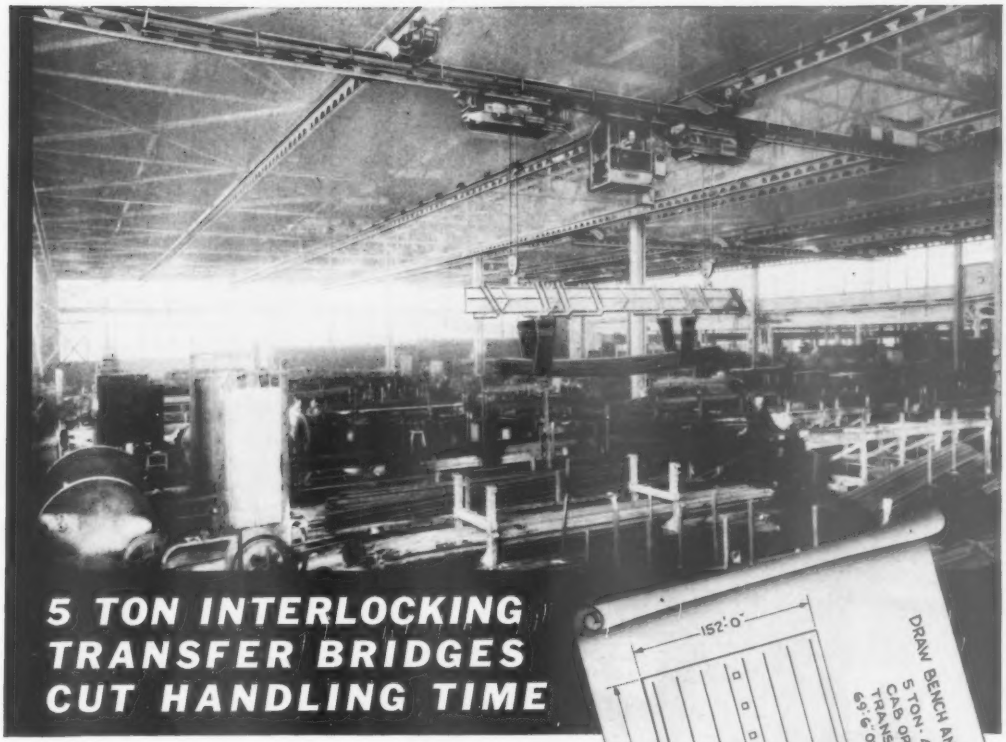
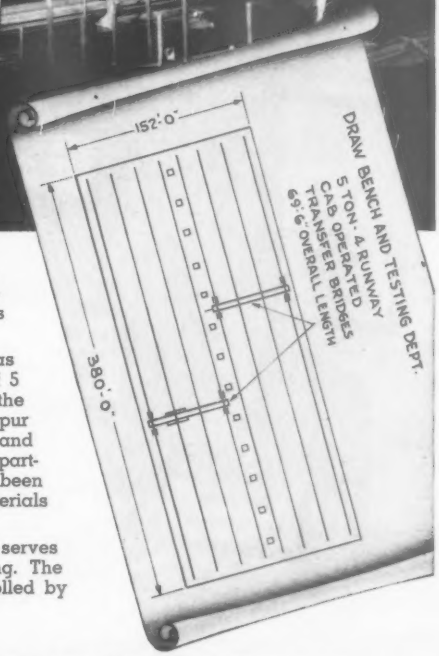


Swing Lathes

Line of 13-in.-swing toolroom lathes features headstock spindle with $1\frac{3}{8}$-in. bore which takes collets with maximum capacity of one inch. This is said to permit machining $1\frac{3}{8}$-in. bar stock fed through the spindle and a suitable chuck, or when used with manufacturer's No. 5 draw-in collet assembly, bar stock up to one inch. The spindle turns in split sleeve bronze alloy bearings. Large individual oil reservoirs and a capillary oiling system provide a film of clean filtered oil. Manufacturer states that when properly operated, there is no metal-to-metal contact in



5 TON INTERLOCKING TRANSFER BRIDGES CUT HANDLING TIME



Careful planning in adapting the proper materials handling equipment to serve the large draw bench and testing department of a prominent copper company has paid real dividends because of resulting efficiency.

Instead of employing standard overhead traveling cranes as originally considered, two 4-runway transfer bridges each of 5 ton capacity are used, one on each side of the columns in the middle of the room. The bridges interlock with a short spur enabling a cab-operated carrier to travel from one to the other and provide complete materials handling coverage of the entire department. Thus time-consuming rehandling that would have been required with standard overhead cranes, in transporting materials from one bay to the other is eliminated.

The single cab-operated double-hoist carrier adequately serves the whole department and carries tubing up to 40 feet long. The carrier as well as the transfer bridges are completely controlled by the operator in the cab.

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THE CLEVELAND CRANE & ENGINEERING CO.
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from RAM HEAD TO BASE!

CIRCULAR GROOVED RAM HEAD
MALLEABLE IRON TOP NUT
PRESSURE BY-PASS PREVENTS OVER-TRAVEL OF RAM
FACTORY TESTED AT 1½ TIMES RATED CAPACITY
MALLEABLE IRON HANDLE SOCKET
PRECISION MACHINED THROUGHOUT
HEINITE PISTON FOR TEN TIMES GREATER WEAR
POSITIVE RELEASE VALVE
SOLID STEEL BASE

Hein-Werner Hydraulic Jacks Give *FASTER....SAFER* Service!

Hein-Werner HYDRAULIC JACKS

Made in models of 1½, 3, 5, 8, 12, 20, 30, 50 and 100 tons capacity. See your industrial supply distributor or write us.

HEIN-WERNER CORPORATION • WAUKESHA • WIS.

the bearings, and the oil is returned to the reservoirs from the bearings so that only an occasional replenishing is required. Reservoir drains are provided so that they may be periodically flushed clean. The underneath motor drive is self-contained and fully enclosed, and provides a range of eight spindle speeds from 34 to 875 r.p.m. A belt tension adjustment is provided. General specifications are 13⅛-in. swing over bed; 7¾-in. swing over saddle cross slide; 48 pitches of screw threads; 48 longitudinal power feeds; 4-, 5-, 6-, or 7-ft. bed lengths; 1⅜-in. hole through spindle; and a maximum collet capacity of 1 inch. South Bend Lathe Works, 298 East Madison St., South Bend 22, Ind.

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Floor Machine

Explosion-proof floor machine, for scrubbing, cleaning, and polishing hazardous areas, was designed for use in petroleum refineries, chemical and munitions plants, distilleries, mills, and other places where a spark might set off an explosion of fumes or dust. All equipment and components used in the machine, called the MC-EX, have been listed by Underwriters Laboratories for use in hazardous areas. 110- or 220-volt capacitor-type motor is 1/3 horsepower for the 14-in. machine, and ¾ horsepower for the 16-in. model. Both are provided with heavy-duty 3-conductor-type cord, with a ground jack. Milti-Clean Products, Inc., 2277 Ford Parkway, St. Paul 1.

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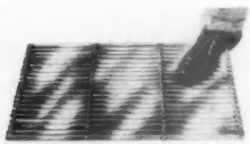


Metal Door Mat

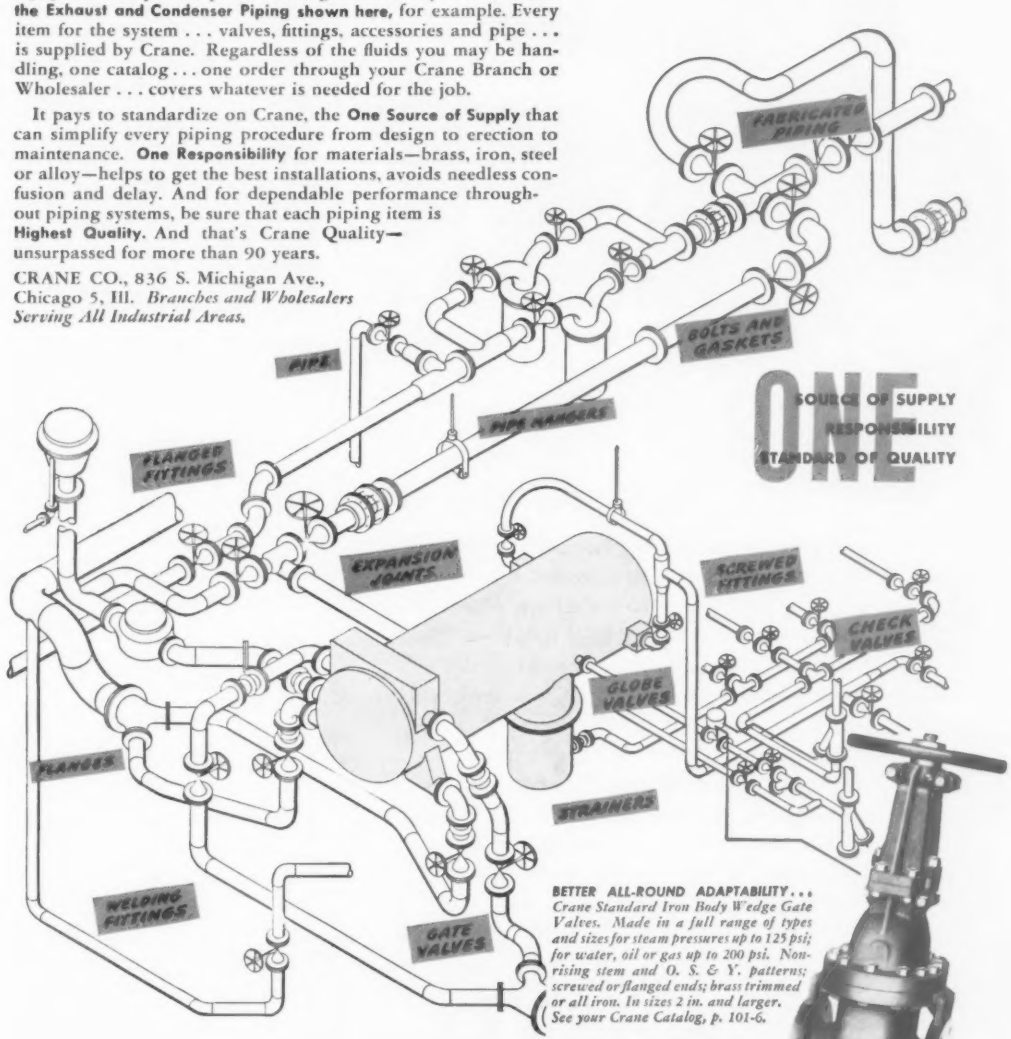
Made of aluminum bars with white brass connecting hinge-rods and die-cast aluminum actuating spacers between each bar, door mat is rust-proof and of rugged construction, according to the manufacturer. Its three sections are hinged, permitting it to lie flat on irregular surfaces. The 21-in. aluminum bars are ½ inch deep, 3/32 of an inch thick, and

Complete Piping Materials Service ...from one complete line

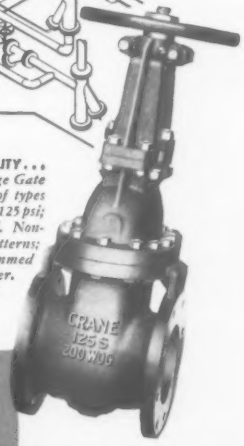
That's the Crane line—the world's most complete source of piping equipment for power, process and general utility services. **Take the Exhaust and Condenser Piping shown here,** for example. Every item for the system . . . valves, fittings, accessories and pipe . . . is supplied by Crane. Regardless of the fluids you may be handling, one catalog . . . one order through your Crane Branch or Wholesaler . . . covers whatever is needed for the job.

It pays to standardize on Crane, the **One Source of Supply** that can simplify every piping procedure from design to erection to maintenance. **One Responsibility** for materials—brass, iron, steel or alloy—helps to get the best installations, avoids needless confusion and delay. And for dependable performance throughout piping systems, be sure that each piping item is **Highest Quality.** And that's Crane Quality—unsurpassed for more than 90 years.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill. *Branches and Wholesalers Serving All Industrial Areas.*



BETTER ALL-ROUND ADAPTABILITY . . . *Crane Standard Iron Body Wedge Gate Valves. Made in a full range of types and sizes for steam pressures up to 125 psi; for water, oil or gas up to 200 psi. Non-rising stem and O. S. & Y. patterns; screwed or flanged ends; brass trimmed or all iron. In sizes 2 in. and larger. See your Crane Catalog, p. 101-6.*



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spaced ¾ of an inch apart. Available in the following sizes: 12½x25, 15½x25, and 18x33 inches. Ability Products, Dept. 79, 1788 Board of Trade Bldg., Chicago 4.

•

Stepless Speed Drive

Furnished in ratings through ½ horsepower, variable-speed drive utilizes a half-wave circuit to provide d.c. flexibility from a.c. power. Known as Type H1 Thy-mo-trol, it is designed to provide, by a turn of a knob at a single control station, smooth stepless speed control for small lathes, conveyors, and other equipment. The drive operates from 220-volt, 60-cycle a.c.; for other voltages a suitable anode transformer is available. It has a 20-to-1 speed range from 1725 to 86 r.p.m. and operates in ambient temperatures from 50 to 104 degrees F. It is furnished in either the non-reversing or the reversing type, the latter being equipped with a separate magnetic reversing switch. Designed for constant-torque loads, under normal conditions the drive is said to have good speed regulation from no load to full load. The speed may be preset, or may be varied during operation and under load. The electronic panel is mounted in a compact, ventilated NEMA Type 1 enclosure. Terminals are located at the front of the panel for ease in wiring, and are separated from the tubes by a protective cover. Control Div., General Electric Co., Schenectady 5, N. Y.

•

Solids Interceptor

Intended to prevent fragments of solids present in waste water from flowing into building drainage lines, solids interceptor was designed for easy cleaning. Impervious, nonmetallic cover may be removed by unlocking a cover clamp, permitting the sediment container to be lifted out. Two perforated metal strainers are used to intercept the solids. The strainer nearest the inlet intercepts the larger fragments, the second filters out any other solids. In addition, manufacturer claims that they serve as baffles to quiet the turbulence of the water, permitting the solids to drop to the bottom of the sediment container. The inlet, approximately four inches from the

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Throughout industry, the story is the same from year to year. Original equipment manufacturers (OEM's) demand substantial gauge value . . . accuracy, durability, and quality at economy prices . . . and 6 out of 10 specify US Gauges.

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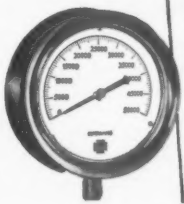
Next time you order gauges, follow the lead of these satisfied users . . . buy US Gauges. For more information about US Gauge write today. United States Gauge, Division of American Machine and Metals, Inc., Sellersville, Penna.

SUPERGAUGE FIG. 1600

For heavy-duty service where a gauge of quality and high accuracy is required. Stainless steel movement with deep bushed bearings. Phosphor bronze, beryllium copper or welded stainless steel bourdon tube in iron or phenolic cases. Lower or back connections. Ranges: 0 to 30" vacuum, 15 to 20,000 lbs. p.s.i.



HIGH PRESSURE SOLID FRONT GAUGES

Designed for testing high pressure gases and liquids these gauges are built to the highest possible standard. Solid wall, cast integral with case, separates the tube and movement section from observer. Bourdon tubes of specially selected beryllium copper or stainless steel are threaded at both ends. Has deep bushed stainless steel movement of high ratio. Cast brass case and ring. Ranges: 100 to 100,000 lbs. pressure.

ABSOLUTE PRESSURE GAUGE

A highly accurate, dependable instrument for measuring absolute pressures. Gauge is seal case type designed to indicate pressure or vacuum admitted to interior actuating the seasoned beryllium copper diaphragm. Black molded phenolic case is corrosion resistant, suitable for use in highly contaminated atmospheres. Dial is 2¾" in diameter. Ranges: 20 millimeters to 100 inches of mercury.

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WITH fire losses mounting and replacement costs soaring to a new high, it's time to double check your fire-fighting equipment. Is every vital location covered, and by the right type of extinguisher? Have you enough extinguishers that no point is farther than 50 feet from a dependable extinguisher? Is every extinguisher freshly charged, ready for instant action?

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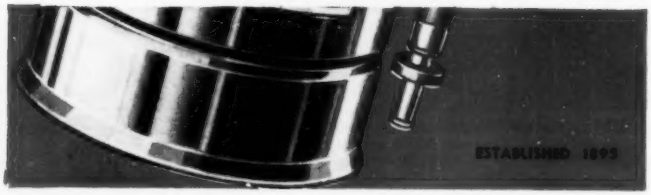

bottom of the device, directs the water upwards to the outlet near the top of opposite side, leaving the collected solids undisturbed. Dept. Z-6, J. A. Zurn Mfg. Co., Erie, Pa.

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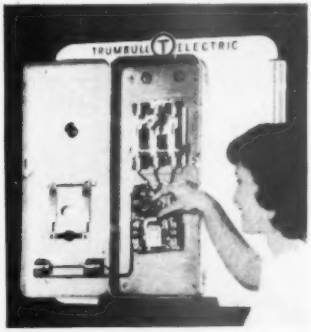

Magnetic Motor Starter, Contactor

Designed to give protection to a.c. motors up to 50 horsepower, 440 volts, magnetic motor starter and contactor features relay heaters and plastic-encased coil. The bi-metallic relay heaters are said to follow the heating curve of the motor, and to adjust for automatic or manual reset by means of a lever. The plastic-encased coil is intended to give long life to the windings by protecting them from moisture, corrosion, and abrasion. Manufacturer claims that a permanent, self-lubricating composition impregnated into the plastic will keep the magnet guides sliding smoothly and eliminate low voltage chatter. The Trumbull Electric Mfg. Co., Plainville, Conn.

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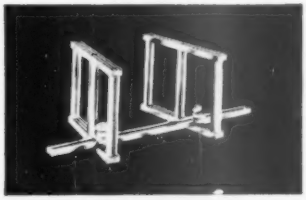

Parallel Units

For supporting tools, dies, and jigs in drilling, counterboring, tapping, milling, and grinding operations, device consists of two parallel units joined together on a rail adjusted to any desired spread by means of two thumb screws. Manufacturer states that its safety features tend to reduce injuries often caused by makeshift methods, and that it eliminates errors due to inaccurate support of tool and machine work. Available in 3-, 5-, and 7-in. heights, 20-in. spread, in standard and heavy-duty types. Acro Die & Stamping Co., 5328 North Kedzie Ave., Chicago 25.

•

Protective Paint

Acid- and alkali-resisting black paint for interior and exterior use, called Chem-Rem (Chemical-Remedy), is suitable for use on metal, masonry,

IN STEEL MILLS

IN FOUNDRIES

IN PAPER MILLS

IN TEXTILE MILLS

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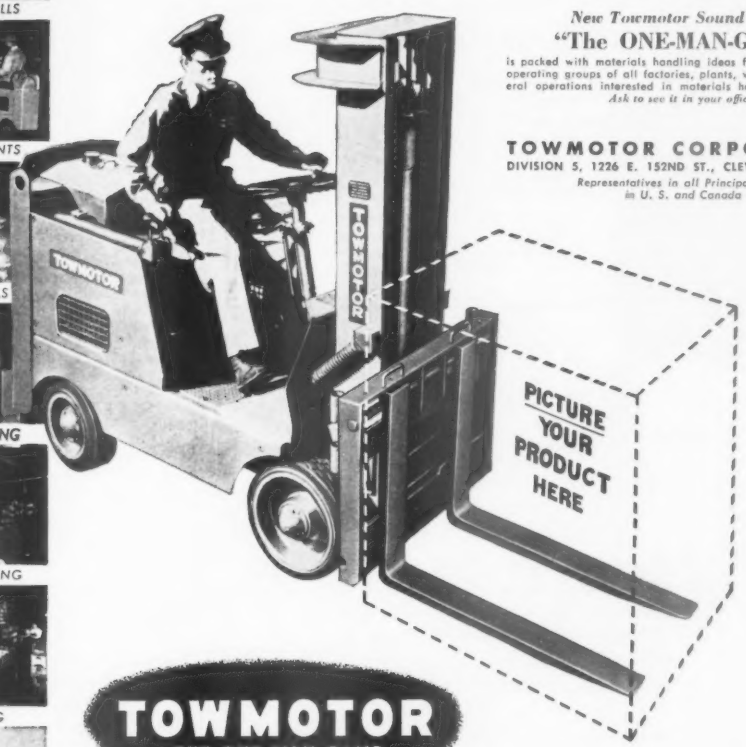

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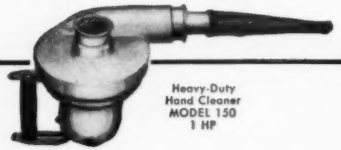
Typical of Ways
General Electric Heavy-Duty Cleaners ARE USED IN INDUSTRY



Heavy-Duty Hand Cleaner MODEL 150 1 HP

CANDY MANUFACTURER... A manufacturer of candy-coated chewing gum uses a General Electric Heavy-Duty Hand Cleaner to get rid of peppermint dust and fumes around the tumbling machine. This is the same type of machine used for dust control in many other manufacturing plants the country over.

Heavy-Duty Cleaner Model 184-A

COSTUME JEWELRY

A manufacturer of women's bracelets uses a General Electric Heavy-Duty Vacuum Cleaner like the one shown here to pick up gold particles off the floor. Weekly cleaning to recover this precious dust is the rule.

The same manufacturer uses a General Electric Hand Cleaner attached to the gold-polishing machine to pick up scrap as it comes off the machine. This is still another example of how this blower-suction model serves industry. What's *your* need?

From removing oil-burner soot to cleaning the plant, cost-conscious plant executives are relying more and more upon General Electric's heavy-duty cleaners.

SPECIALIZED TOOLS — brushes and nozzles for various uses — expand the many services of these modern suction cleaners. In every particular, cleaners and accessories are designed with true General Electric skill . . . and built to give years of faultless service.

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or wood. It is said to withstand attacks of acetic and hydrochloric acids, dilute sulphuric acids, or mixtures of these, as well as to protect against the action of bleaching solutions, dilute caustic acids, ammonia, and other alkalis. Manufacturer states that it is particularly suitable for locations where smoke and chemical fumes are prevalent. It may be applied by brush, spray, or dip methods. It dries to the touch in one hour, sets in three. Three coats are considered to give maximum protection. It cannot be painted over. Other features are said to include imperviousness to moisture, elasticity said to render it unaffected by temperature changes, and high resistance to oil and oil fumes. Speco, Inc., 7308 Associate Ave., Cleveland.

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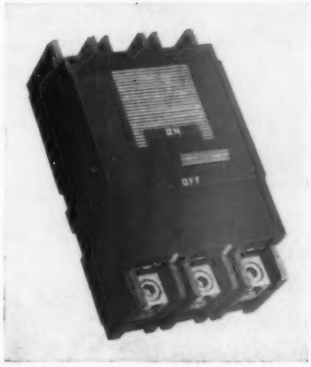


Circuit Interrupters

Available in weatherproof, dust-tight, dust-resisting, and explosion-resisting types, circuit interrupters in cast iron enclosures are suitable for location in dusty, gritty, explosive or other hazardous atmospheres, outdoors or indoors, and in locations exposed to splashing or dripping water. The interrupters are identical to corresponding circuit breakers, but do not have thermal and magnetic trip features. They are designed for use in locations where space is limited and a local disconnect means is required. Square D Co., 6060 Rivard St., Detroit 11.

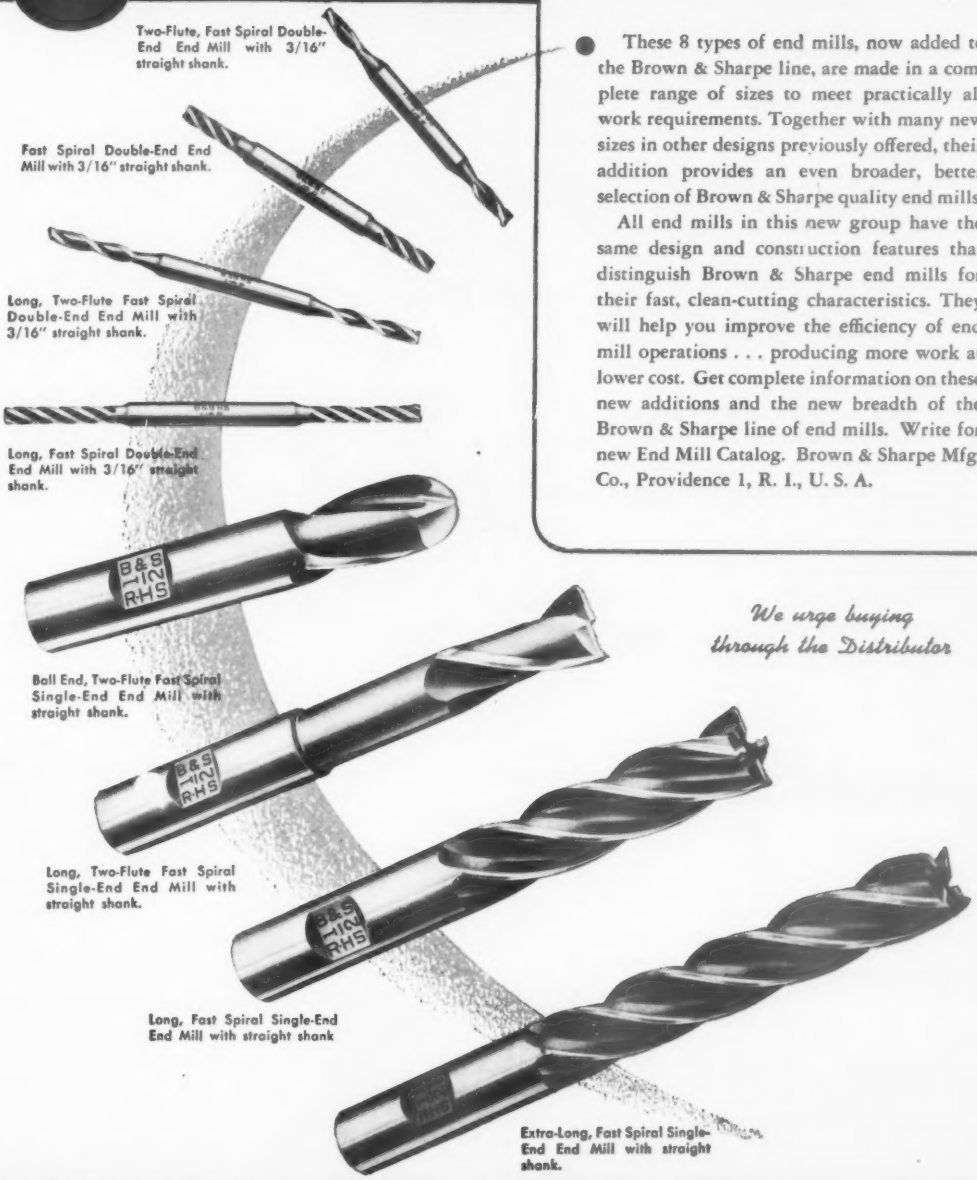
•

Electric Hoists

Line of Speedway electric hoists is made in capacities from 1000 to 20,000 pounds. Design incorporates all-steel construction and gear train, with preformed cable and swaged-on cable fittings. Other features include ball-bearing, fully enclosed NEMA motors, splined connections, grooved steel cable drum, jaw-type brake, rabbeted male and female frame connections, pushbutton controls, Hyatt roller bearings, and safety limit stop. Furnished in lug, hook, plain, or geared Timken trolley (mounted crosswise or parallel to runway beam), 4-part single reeve, close headroom, base mounted, and with motor-driven Timken trolley. Built for 220-volt, 3-phase a.c., and reconnectable for use on 440-volt, 3-phase a.c. They can also be furnished for 115- and 230-volt d.c., and for

BROWN & SHARPE *offers*

8


Two-Flute, Fast Spiral Double-End End Mill with 3/16" straight shank.
Fast Spiral Double-End End Mill with 3/16" straight shank.
Long, Two-Flute Fast Spiral Double-End End Mill with 3/16" straight shank.
Long, Fast Spiral Double-End End Mill with 3/16" straight shank.
Ball End, Two-Flute Fast Spiral Single-End End Mill with straight shank.
Long, Two-Flute Fast Spiral Single-End End Mill with straight shank.
Long, Fast Spiral Single-End End Mill with straight shank
Extra-Long, Fast Spiral Single-End End Mill with straight shank.

These 8 types of end mills, now added to the Brown & Sharpe line, are made in a complete range of sizes to meet practically all work requirements. Together with many new sizes in other designs previously offered, their addition provides an even broader, better selection of Brown & Sharpe quality end mills.

All end mills in this new group have the same design and construction features that distinguish Brown & Sharpe end mills for their fast, clean-cutting characteristics. They will help you improve the efficiency of end mill operations . . . producing more work at lower cost. Get complete information on these new additions and the new breadth of the Brown & Sharpe line of end mills. Write for new End Mill Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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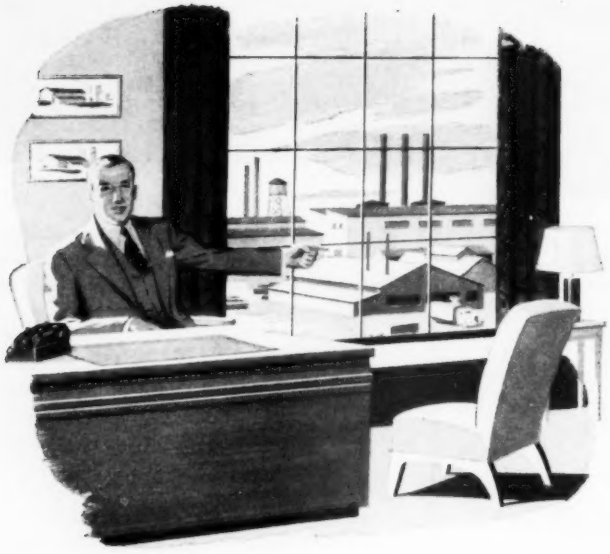

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THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

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other voltages and frequencies in either 3- or 2-phase applications. Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

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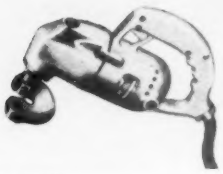

Metal Shear

Capable of cutting 12-gage standard sheet steel, portable metal shear is called Porto-Shear. Manufacturer claims that the shear will follow an irregular pattern since the cutting blade is always visible, and that it will cut on a radius as small as 1½ inches. The rapid reciprocating action of the vertical blade against the stationary horizontal blade is said to eliminate burrs or ragged edges. The universal motor powering the saw delivers 1100 strokes per minute at full load. The Black & Decker Mfg. Co., Towson 4, Md.

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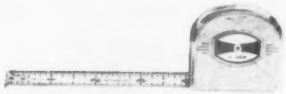

Flexible Steel Rules

"Pull-Push" rules, Nos. 346 and 348, feature die-cast D-shaped case; triple-plated finish (chrome over nickel over copper); nickel plated or white baked enamel blades; vertical marking. Blades are rigid steel for measuring straight distances in any position, and flexible for circumferences and irregular shapes. Available in 6- and 8-ft. lengths. Stanley Tools, New Britain, Conn.

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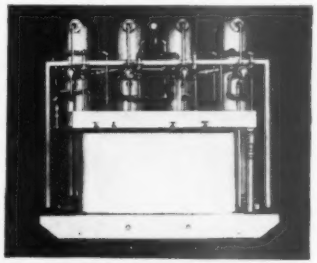

Water Demineralizer

Line of water demineralizers, said to deliver the chemical equivalent of distilled water, requires no heat. The dissolved mineral salts in the water are removed by chemical action and absorption in passing the water through beds of ion-exchange resins. Depending upon the hardness of the raw water and the volume required, these ion-exchange demineralizers are available in a variety of

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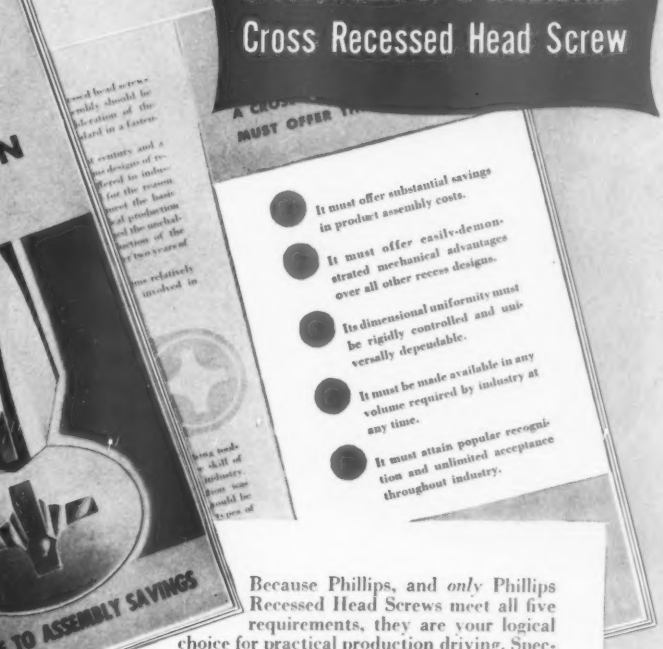
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sizes and models. Units, in both two- and four-bed models, are said to deliver up to 1000 g.p.h., and special units of any capacity may be obtained on order. Industrial Filter & Pump Mfg. Co., 1621 West Carroll Ave., Chicago 12.

•

Dust Collector Suction Tube Assembly

For connecting manufacturer's self-contained dust collectors to wheels on surface grinders, tool and cutter grinders, and other machines that cannot be properly hooded, suction tube assembly is made in 3- and 4-in. sizes to fit standard inlet holes, with duck-covered hose. The holding framework closely follows the curve of the tubing. This is said to permit placing of the nozzle directly in the dust stream with a minimum of interference in working operations. Assemblies can be fitted with either vertical or angular type nozzles. Torit Mfg. Co., 303 Walnut St., St. Paul 2.

•

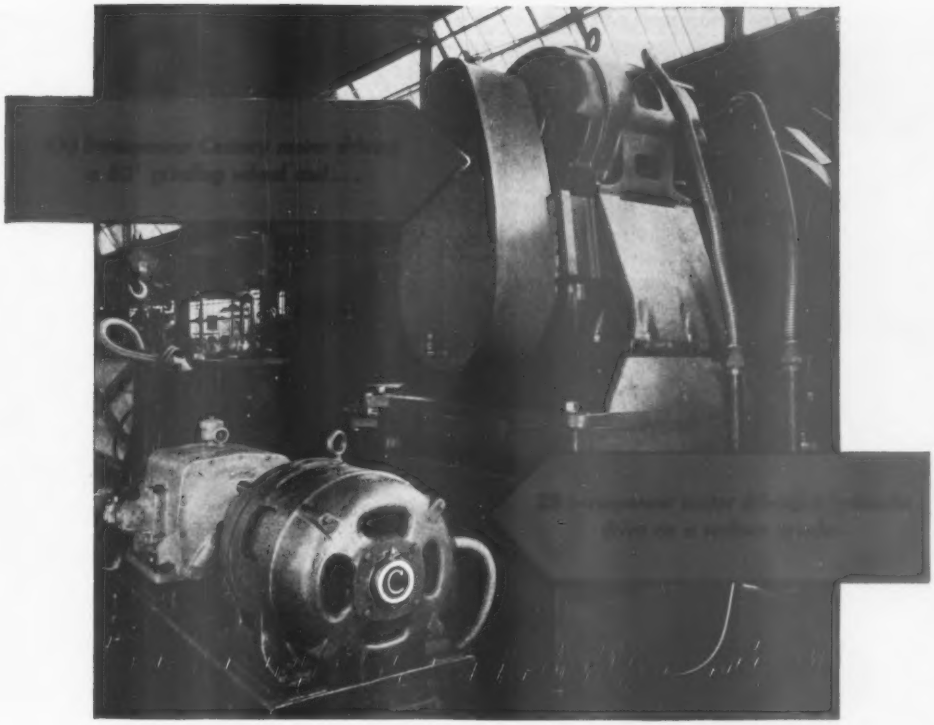
Spray-Gun Air Filter, Regulator

For use with medium-production spray guns, air conditioner, called Black Arrow Model N9600, is capable of handling 35 cubic feet per minute at 80 pounds pressure, according to manufacturer. It is made of rustless materials, with no die cast parts or through bolts used in its construction. The cylinder tube is cold impact extruded aluminum, the filtering element is of brass, and the regulator body of forged brass with a stainless steel air valve assembly. The regulator cap is equipped with a stainless steel insert said to eliminate freezing of the pressure regulating key. Oxygen-type regulator and gage showing regulated air pressure are standard equipment. A drain cock permits removal of moisture and oil. The Black Mfg. Co., Baltimore, Md.

•

Metal Door

Furnished in one standardized size, 3x7 feet, hollow-metal entrance doors may be used in single or double openings, and are supplied with a standard cylinder lock. Bronze push and pull bars and bronze ball bearing hinges are available, and the doors may be hinged right or left, to swing in or out. Stock door comes complete with frames and hardware fitted and ready to assemble. Detroit Steel Products Co., 3161 Griffin St., Detroit 11.



100 H. P. Century MOTOR—Driving a 60" Grinding Wheel Provides a Smooth Production Combination

This 100 H.P. Century Motor operating a huge 60" surface grinder and the 25 H.P. Century motor operating the feeder mechanism, is one of the hundreds of thousands of Century drives used in the precision production industries.

The unusual freedom from vibration designed and built into Century motors, contributes to the precision grinding at the business end of the grinder that was intended by the manufacturer of this fine tool.

The rugged mechanical design of Century motors are suitable not only to precision applications like this but also for the heavy shock loads required in some industrial operations.

From Century's wide range of types and kinds of motors, in sizes from 1/6 to 400 horsepower, you can select the correct motor to meet the exact requirements of your machines. The properly selected Century motor on your machine tools, conveyors, processing machinery, etc., helps to increase productivity, keep maintenance costs low and reduce plant shutdowns caused by improperly applied motors.

Specify Century motors for all of your electric power requirements.

Century MOTORS

Popular types and ratings are generally available from factory and branch office stocks

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Offices and Stock Points in Principal Cities

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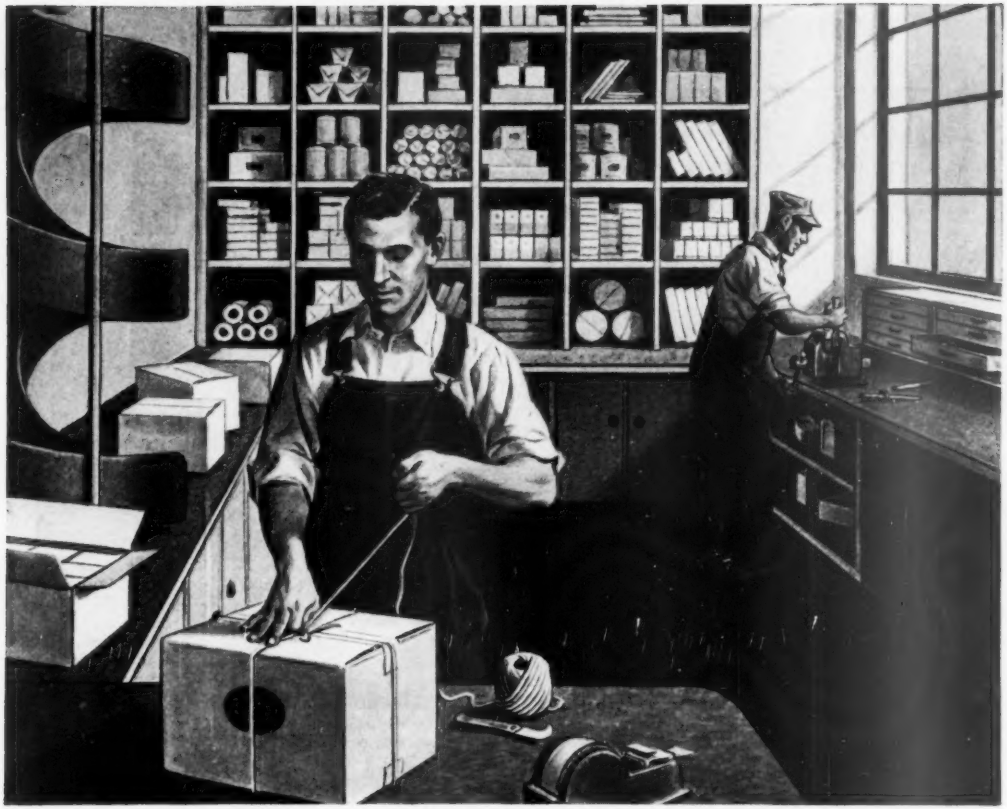

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Tough, durable Masonite Tempered Presdwood outwears most materials in hundreds of heavy-duty applications around shop or factory.

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more about the items on this page

Letters to the addresses given will bring you further information.

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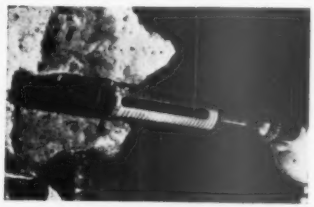
POSTAL SCALE has time-saving dial. Rates are in tabular form in center of dial. Pointer is behind dial. Capacity is 10 pounds by ounces. Pelouze Mfg. Co., 1218 Chicago Ave., Evanston, Ill.

PAYROLL SLIDE RULE called Time-Tab, computes accrued, elapsed payroll time. Hourly segments, divided into minutes, allow for overtime reckoning. Time-Tab, Inc., 2525 Fruitland Ave., Los Angeles 11.

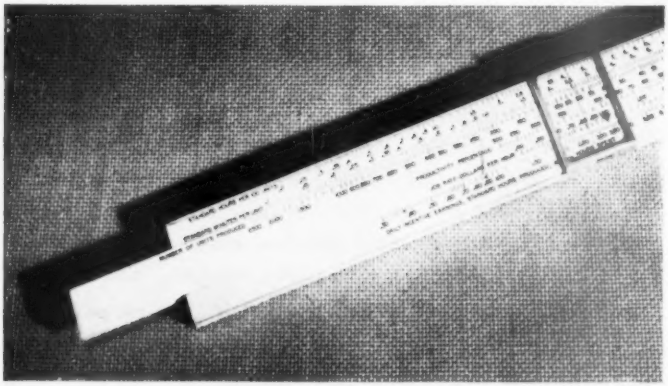
TAFT-HARTLEY FOLDER, "Before and After the Labor-Management Relations Act of 1947." Four-page tabloid-size newsprint folder. Cartoons of "before" and "after" situations. Any quantity. Andrew Gahagan Associates, 270 Park Ave., New York 17.

LEAD DETECTOR. Instrument shows amount of lead in air, can be wheeled throughout plant for air inspection. E. I. duPont de Nemours & Co., Wilmington 98, Del.

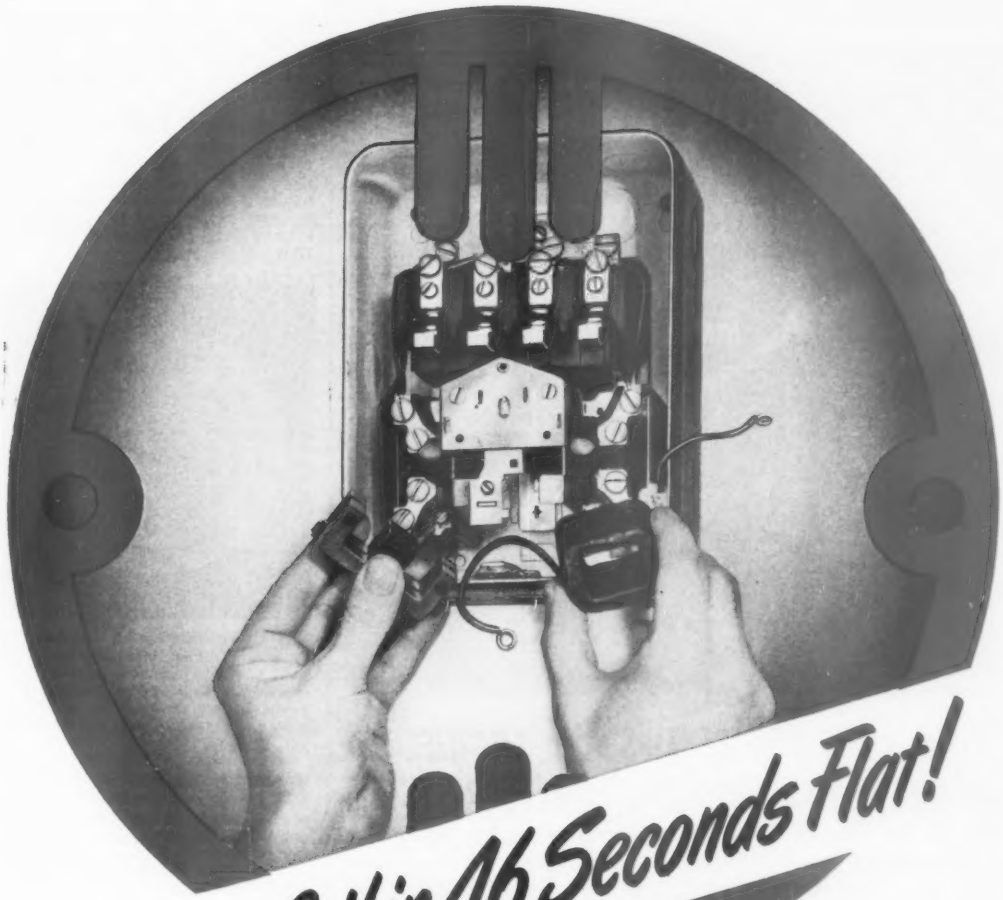


ROTARY CONCRETE DRILL. Penetrates concrete at rate of 2 inches or more per minute in diameters of from ¼ to 2 inches. Also drills glass, steel, rock. Side exhaust slot permits escape of core particles. Sintered carbide cutters can be resharpened. Tilden Tool Mfg. Co., 1995 North Fair Oaks Ave., Pasadena 3, Calif.

PROTECTIVE COATING of latex, Anode HR, for textiles, fabrics. Heat-, chemical-resistant. For radiator hose, insulating tapes and papers, gaskets, beltings, similar applications. Also series of plastisols, a dispersion of resin, other compounds, in plasticizer without volatile or-



WAGE INCENTIVE SLIDE RULE determines allowable standard times for production, percentage of productivity, incentive earnings, standard and actual labor costs, other calculations. For use in maintaining daily individual records in mass production plants. The Bonus Rule Co., 4 Crockett St., Rowayton, Conn.



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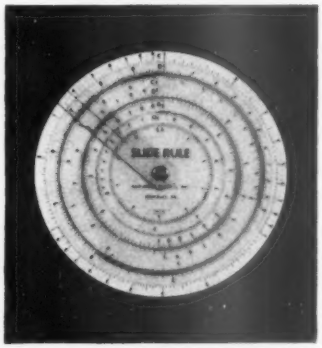
PRINTED STICKERS on pressure-sensitive cellophane or acetate fibre tape. For marking parts, wires, tubing; for coding, warning labels, nameplates, instructions. Printed in 2 colors on choice of 12 background colors. Topflight Tape Co., Huber Bldg., York, Pa.



CIRCULAR SLIDE RULE of laminated plastic. For multiplication, division, finding squares or square roots, cubes or cube roots, reciprocals, proportions. 4¼ inches in diameter. Allegheny Plastics, Inc., 318 Chestnut Rd., Sewickley, Pa.

BUSINESS BOOMS & DEPRESSIONS. Chart reports economic progress, savings, national economy, population, business activity, spending the dollar. From 1794 through 1948. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32.

WORK BACKGROUND MUSIC on 12-in. vinylite records, called Chrome Seal Transcriptions. Both regular 78 r.p.m. and 33 1/3 r.p.m. long-playing disks. 10-record sets. Instrumental only. Names of selections, slow or fast tempo, recommended time of day for playing on each record. Also recreational music. R. K. B. Associates, 2206 North Western Ave., Chicago 47.

ICE, SNOW MELTING POWDER called Ice Rem. One pound said to equal ten pounds of salt, leaving no residue. Speco, Inc., 7308 Associate Ave., Cleveland 9.

BOOKLET — Bulletin of Research No. 42, "The Life Hazards and Nature of the Products Formed When Chlorobromomethane Extinguisher Liquid Is Applied to Fires." Underwriters' Laboratories, Inc., 207 East Ohio St., Chicago 11.

PERFORMANCE COMPARISON CHART for checking different multiple-spindle automatic bar ma-

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N-B-M "Improved"—A dependable, highly anti-frictional general service Lead-Base Babbitt. Tin toughened-copper hardened. Will not cut, scar or grip shaft. For all bearings operating at normal speeds, temperatures and pressures.

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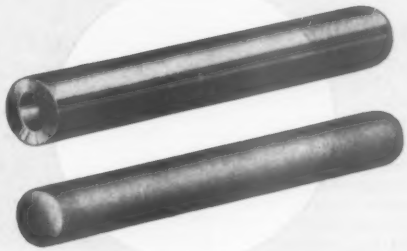

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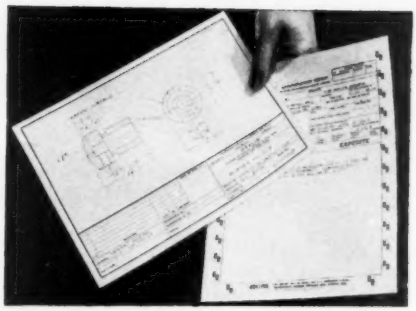

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Put it next to a sheet of any Ozalid material (paper, plastic, cloth, black, blue, red, sepia) and then feed it into an Ozalid machine.

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chines. Analysis of work and tool capacity; power, coolant, chip disposal, lubrication, job setting capacities; work and tool support; power transmission support; maintenance. Cone Automatic Machine Co., Inc., Windsor, Vt.

ENAMEL FOR ALUMINUM ALLOYS fired on strips, sheets, and castings in furnaces similar to those used to apply porcelain to steel, but at lower temperatures. Suitable for use on 61-8 wrought and 43 casting alloys. Electro-Chemicals Dept., E. I. du Pont de Nemours & Co., Wilmington, Del.

SCALE FOR CRANES, HOISTS uses static pressure principle, no springs, no levers, no moving parts. Permanently sealed, unaffected by temperature. 2-, 5-, and 10-ton models. Hydroway Scales, Inc., 7632 Fenkell, Detroit 21.

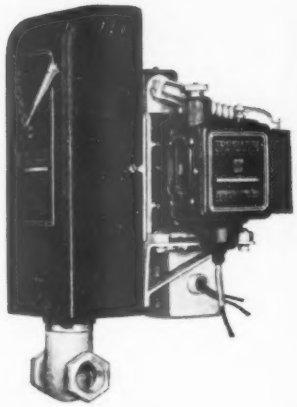
FILMS:

And In Return. Produced by steel industry to demonstrate how a fair day's pay is determined, basis on which it can be measured in terms of work speed, and need of a fair day's work for a fair day's pay. Audience participates in scoring the pacing of typical operations. 16 mm., sound; two 2000-ft. reels. The American Associated Consultants, Inc., c/o Cooperative Wage Bureau, 3315 Grant Bldg., Pittsburgh.

The One-Man Gang pictures materials handling methods employed by various manufacturers to reduce costs. Demonstrates different operations made possible by use of manufacturers products and accessories. 30-min. sound movie. Towmotor Corp., 1226 East 152nd St., Cleveland 10.

It Must Be Somewhere! Report on simplified records management, filing methods. Color, sound; 30 minutes. Systems Div., Remington Rand, 315 Fourth Ave., New York 10.

DOES COLD WATER KEEP YOU *in Hot Water?*



This Honeywell Controller Will Solve Your Problem

INDIRECT heaters for maintaining an adequate hot water supply for your plant *can be controlled!*

Hot water requirements vary from time to time. Uncontrolled heaters may cause damage by over-heating or cause inconvenience when the supply is not sufficient to meet the demand.

The Honeywell Controller provides *complete control* in one self-contained, easily mounted unit, which costs but $75.00 for the average installation. It pays for itself in a short time by minimizing steam consumption. And it assures you of an adequate supply of hot water . . . when you need it *and as you need it!*

Write for Instrumentation Data Sheet 11.3-3 . . . for complete details.

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Saves Costly Man-Hours
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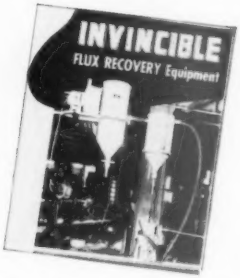
Describes and illustrates the *complete* Invincible line — includes installation views — send for your copy *NOW!*



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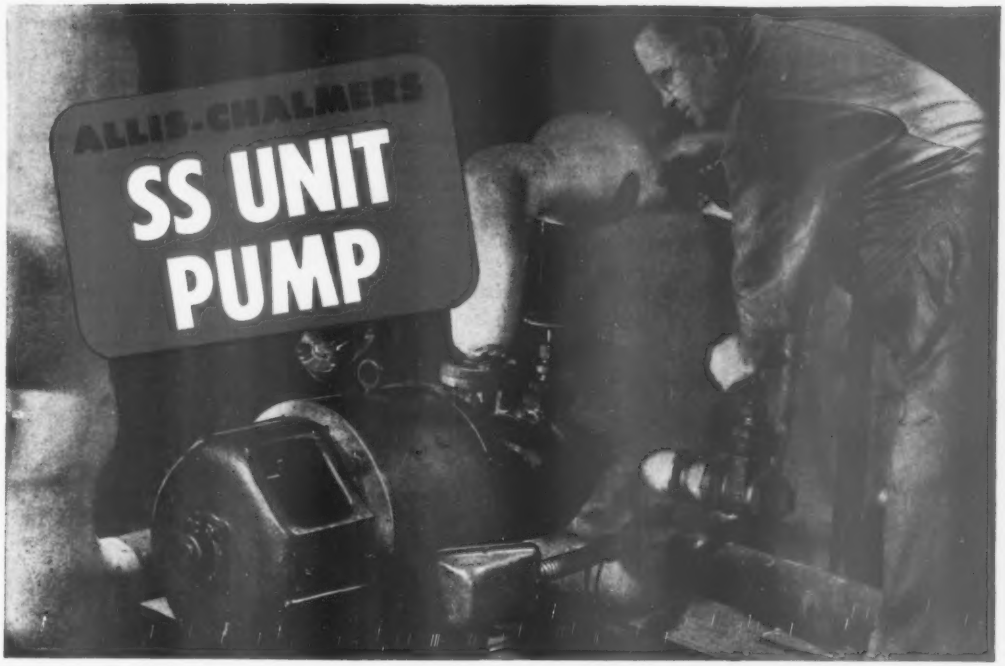

50% MORE WATER
33% LESS POWER

"Our *old* displacement pump required 15 hp motor to raise 100 gpm 110 ft to roof tanks. *Now* this A-C SS Unit Pump Lifts 150 gpm to same tanks with only a 10 hp motor!"

THAT'S THE EXPERIENCE, along with worthwhile savings in space and maintenance, reported by the chief engineer of a large commercial building.

It is the kind of saving that you, too, may be able to make with Allis-Chalmers SS Unit Pumps. Here are 4 reasons why:—

Deliver Rated Efficiencies — Every unit tested at the factory and the performance curve plotted. Efficiency is proved.

Heavy Construction — Compare section thicknesses, shaft diameters and other features. See why SS Unit Pumps run years without repairs.

Easy Maintenance — Compact design and few parts reduce maintenance. Bronze ring protects casing from wear. Is easily replaced when required.

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SS Unit is one of many Allis-Chalmers models for most industrial pumping services. For information, see your Allis-Chalmers Authorized Dealer or District Office. Or write for Bulletin 52B6059E. Also listed in Sweet's. A 2595

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TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

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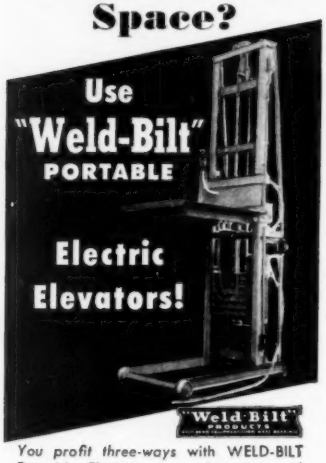
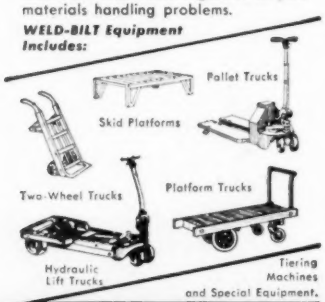


You profit three-ways with WELD-BILT Portable Elevators . . . Improve and speed up storage efficiency — save valuable floor space — which in turn may release more space for money-making production.

Ceiling-high stacking of crates, bundles or skid-loads is simple and fast when you use a WELD-BILT Elevator. Easily-moved, electric motor powered, controlled by convenient push-button and automatic top-and-bottom limit switches, WELD-BILT elevators save both time and labor. You'll find one exactly suited to your needs — single, double telescopic, or hinged types, motor or hand operated, in capacities from 500 to 4000 lbs.

In your plant, too, WELD-BILT Elevators may more than save their cost! Write for catalog — or for profitable suggestions from WELD-BILT engineers on your materials handling problems.

WELD-BILT Equipment Includes:



WEST BEND EQUIPMENT COMPANY
Materials Handling Engineers
313 Water Street, West Bend, Wisconsin

SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Adjunct Professor of Industrial Relations, New York University, and a Member of the New York Bar

Period Surveyed: December 1 to January 1

Trend Indicators

Wage Hours

BONUS HELD PART OF REGULAR RATE

Bonus payments were held to be part of the "regular rate" of pay for the purposes of computing overtime in a company where the payments were based on employees' hourly rates of pay and were paid at regular recurring intervals, approximately every three months. The court found that the bonus payments generally followed a resolution of the company's board of directors making provision for the payments as "additional compensation for services rendered." Furthermore, the court pointed out the company always deducted social security taxes from the bonus payments and included them as "Salary and Wages" in its income tax returns and also included them in computing the premium on its workmen's compensation insurance and unemployment insurance. The employees were of the opinion that these bonus payments would continue to be made and regarded them as an integral part of the total earnings received for the work performed. In holding that the payments should be included in the regular rate, the court said: "The undenied, crucial fact here is that the bonuses were regularly paid. Although the employees knew they could not legally compel the company to make these payments, no one can doubt that the employees assumed that, in the normal course of events, the employees would receive them. That seems to us to be enough to constitute them part of the 'regular rate' at which the men were employed." (McComb V. Shepard Niles C & H Corporation, CCA-2)

CONTRACTOR HELD GUILTY OF VIOLATING CHILD LABOR PROVISIONS

A contractor was held guilty of violating the child labor provisions of the Act when he had actual knowledge of the underage status of three boys whom he employed, since they told their correct age to the foreman who hired them. Similarly, the employer was held to have violated the Act when he employed a boy 14 years old, having constructive knowledge that the boy was under 16 years of age, since his appearance was sufficiently youthful to raise the question as to whether he was 16. (Forest Products Company, Decision of Hearing Examiner Under Public Contracts Act)

EMPLOYEES HELD NOT ENTITLED TO RECOVER OVERTIME

Employees cannot recover overtime compensation from an employer for work performed prior to the enactment of the Act unless they can prove that the overtime work was compensable by contract, custom, or practice. Even though the employees claimed the overtime work was not preliminary or postliminary but an integral part of the principal activities of the employer, Section 2 (a) of the Portal-to-Portal Act bars them from recovering the overtime compensation. In conclusion, the court said, "Employees cannot recover for alleged overtime work unless they allege and prove that this work was compensable under some effective 'written or non-written contract' or a 'custom or practice' in effect at the time of such activity." (Sinclair v. U.S. Gypsum Company, USDC W. New York)

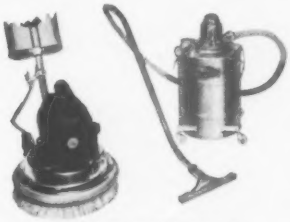
ADMINISTRATOR ENTITLED TO ORDER THAT COMPANY PRODUCE RECORDS

Where an administrator was trying to determine whether a company violated the Act, it is entitled to an order that the company produce its records of employees' hours, wages, and general nature of work; however, it may not require the company to produce its records of customers' transactions and interstate purchases and transportation of goods. The court pointed out that if after examining these records, the Administrator finds need for additional information, he should apply for a further order to produce additional necessary records. (McComb v. Hunsaker Trucking Contractor; CCA-5)

HELD EXEMPT

A supervisor of a repair department was held to be an executive employee, exempt from the provisions of the Fair Labor Standards Act, in a company where he had general charge of and full responsibility for the department. The court also found

With Dispenser for Hot Waxing



With Water Tank and Vacuum for Rug Scrubbing

With Pad for Steel-Wooling

THE MOTOR-WEIGHTED MACHINE THAT GIVES YOU

8-Way Adaptability!

Those who need a motor-weighted floor-maintenance machine will find that they can do more—and thus save more on labor costs—with a *600 Series Finnell*. This general-purpose *Finnell* can be used to wet-scrub, apply wax, polish, scrub rugs, steel-wool, dry-scrub, sand, and grind!

A *Feather-Touch* Safety Switch provides *complete* automatic switch control. Switch works with either hand from either side of handle. When handle is released, machine stops. Self-propelled . . . the machine glides over the floor with virtually effortless guidance. Horizontally-mounted motor and correct distribution of weight afford truly balanced operation.

Combination V-belt and gear case speed reduction assures transmission flexibility . . . alleviates strain on motor and gears. G. E. Drip-Proof Capacitor Motor . . . Timken Bearings . . . ruggedly constructed worm drive in extra-capacity leak-proof gear case, lubricated for 2500 hours. Smooth and noiseless in performance . . . a precision product throughout. Four sizes: 11, 15, 18, and 21-inch brush diameter.

The nearby *Finnell man* is readily available for free floor survey, demonstration, or consultation . . . and for training your maintenance operators in the proper use of *Finnell* equipment. Phone or write nearest *Finnell* branch or Finnell System, Inc., 2502 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

Everything FINNELL for Floor Care

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Interchangeable Brush Rings and Discs

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Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

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in coolers and fountains

In every plant workers need the refreshing stimulation of a constant supply of cool water. And in every instant Halsey Taylor Coolers help provide abundant water and vital protection against contamination too! Cooler and fountain combinations or separate coolers for use with fountains strategically placed in office or shop. *Ask for literature.*

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At 9 out of 10 of the largest and most important decision points in American industrial purchasing, MacRAE'S BLUE BOOK is used as a reference source "principally" or "exclusively."

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LABOR DEVELOPMENTS *(continued)*

that the supervisor directed other employees at the department; customarily and regularly exercised discretionary powers; made suggestions and recommendations as to hiring and firing, advancement, promotion, and other changes of status, which were given particular weight by the management; and spent less than 20 per cent of the number of hours of an average non-exempt employee in manual labor. (Raque v. Dexter Folding Co., USDC S. New York)

Labor-Management Relations

***DISCHARGE UNJUSTIFIED**

An employee member of a union negotiating committee, discharged for insulting management while dealing with it on behalf of other employees, was held to have been discriminatorily discharged. The Labor-Management Relations Act protects the making of statements by an employee representative in the course of his dealing with the employer on behalf of the employees. "The employee representatives should be permitted the broadest, frankest, and freest possible statement of their positions and pertinent arguments in such language of vigor and clarity, as comes naturally to them and seems reasonably related to their objectives as employee-representatives." (N. P. Nelson Iron Works, Inc., and Iron Workers Association; NLRB)

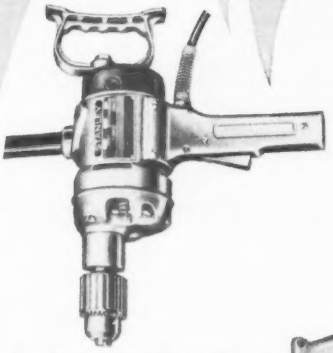
Management was unjustified in discharging a worker whose production had fallen so that he was maintaining only standard output, since the contract provided for incentive earnings but specified that production above set "standards" shall be voluntary. The arbitrator agreed with the union's contention that if an employee produces an amount which is standard for his particular job and does not choose to enjoy the incentive yield derived from production above standard, he has the right to do so under the contract. (In re arbitration between Harvill New England Corporation and International Association of Machinists)

***DISCHARGE OF PROBATIONARY EMPLOYEES HELD ARBITRABLE**

Under a contract which only referred to probationary employees in the seniority clause and provided that the right to discharge employees shall be in the sole discretion of the company, making no exception to probationary employees and providing for arbitration of disputes, the discharge of a probationary employee was held to be arbitrable. The company contended that the logical meaning of the seniority clause is

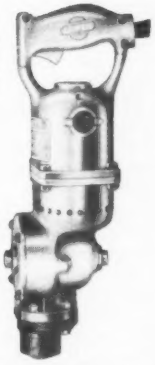
* In this classification, items marked with an asterisk also are considered to be trend indicators.

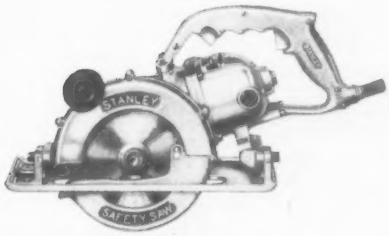
Standardize on Stanley JOB-PROVED electric tools



TINY 218 UNISHEAR . . . Cuts 18 gauge steel at speeds up to 15 feet a minute. Operator only has to guide it. Cuts right to the line . . . curves, angles or notches with hairline accuracy . . . inside or outside. Sturdy aluminum alloy housing, ball bearings, slide operated switch, duplex handle. Blades easily removed, resharpened and replaced.

No. 121 ELECTRIC DRILL—¼" capacity . . . Lightweight production tool, ideal for millwrights and maintenance men.





No. W8 SAFETY SAW— 0 to 2¾" capacity . . . Duplex handle, easy adjustment for depth and bevel cutting. Non-warping heat-treated aluminum base. Blade totally guarded.

No. 310A ELECTRIC HAMMER— 1⅛" capacity . . . Drills, chips, channels, chisels, scales, vibrates . . . any work requiring hammer action.

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dust off your production line

for more economy savings quality profits

more economy Pangborn Dust Control gives you more economy of plant operation by removing industrial dust from working areas. One Pangborn customer compared his expenses before and after installation of Pangborn Equipment and revealed savings of $8000 per year.

more savings Pangborn Dust Control can save you money as it did for a well-known foundry where Pangborn Equipment corrected problems impairing worker efficiency, speeded up production and indirectly saved 25%.

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Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.

STOP THE DUST HOG from stealing profits with

Pangborn DUST CONTROL

LABOR DEVELOPMENTS *(continued)*

that it gives to management a greater freedom and discretion in terminating an employment relationship before an employee acquires seniority rights and "that if this were not so, probationary status would have no meaning at all." The union, however, claimed that the section of the contract which limits the right of management to discharge for cause only permits no exception in the application of this principle with respect to probationary employees. In deciding for the union, the arbitrator pointed out that although probationary clauses are reasonable and are contained in other contracts, "he is not authorized to assume their existence in a contract which does not contain them or to apply them in a case where they are absent from a contract." The arbitrator further pointed out that the only mention of a probationary period in the contract is done in connection with the acquisition of departmental seniority and gives no unqualified right to the employer to discharge a probationary employee. (In re arbitration between F. L. Jacobs Company and United Automobile, Aircraft and Agricultural Implement Workers of America)

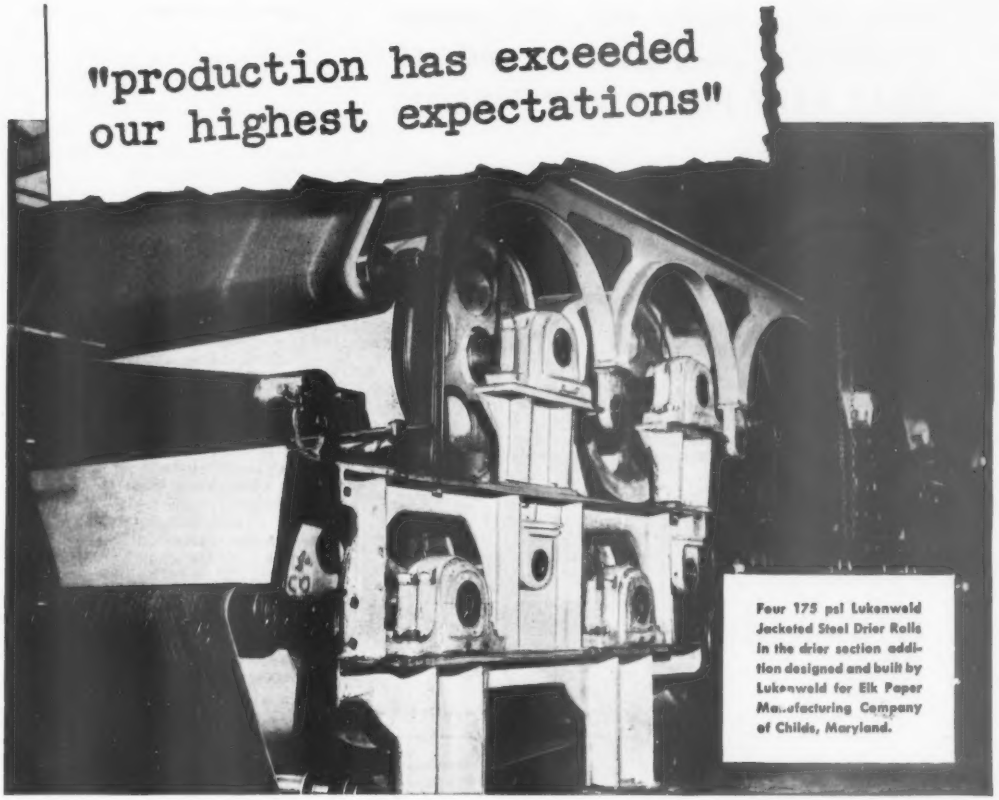
***DISCIPLINE UNJUSTIFIED WHEN EMPLOYEES REFUSE OVERTIME**

Employees were improperly disciplined for refusing to work overtime when the contract provided that there will be no concerted refusal to perform overtime work, since the only overtime announcement was made generally by the foreman shortly before quitting time, but was not relayed positively to the employees. In determining whether the employees complied with management's requirement to work overtime, the arbitrator said, "The matter of properly conveying the request is of real importance." (In re arbitration between Gorton-Pew Fisheries Co., Ltd., and International Longshoremen's Association)

EMPLOYER HELD GUILTY OF VIOLATING THE ACT

An employer was guilty of violating the Act where he refused to negotiate a second contract with a certified union within less than one year after the union had been certified by the Board, on the ground that a rival union claimed representation. The Board held that the majority status of a labor organization established by an election and certification must be given effect for a reasonable period, generally deemed to be one year, "even though the majority support of the organization was dissipated thereafter without the commission of any unfair practices on the part of the employer." Despite the fact that the contract between the parties was only for a period of six months, that period cannot be

"production has exceeded our highest expectations"



Four 175 psi Lukenweld Jacketed Steel Drier Rolls in the drier section addition designed and built by Lukenweld for Elk Paper Ma..ufacturing Company of Childs, Maryland.

...with this Lukenweld drier section addition

Co-operation between operating men with drying problems and Lukenweld engineers brings in frequent reports like this one from Elk Paper—increased output, higher quality production, safer operation.

As designers and manufacturers of complete drying machinery, we at Lukenweld are well acquainted with drying operations in many industries. We'll take your ideas and put them to work—first a design on paper, then a pilot model if desirable, a finished machine or structure, and its installation. Lukenweld service is that complete.

If the job calls for Drier Rolls... Hundreds of Lukenweld Jacketed Steel Drier Rolls, in service today in the paper, chemical, drug, food, plastic and other industries, are proving they'll do the job faster, better and safer. *Faster* because of reduced wall thickness and positive scavenging of entrapped air, condensate and film from steam passages, assuring higher efficiency. *Better* because surface temperatures are even and constant. *Safer* because of their high-strength, steel plate construction.

For drying help, or for Bulletin 358 telling about Lukenweld Drier Rolls, write Lukenweld, Division of Lukens Steel Company, 421 Lukens Building, Coatesville, Pennsylvania.

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DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY

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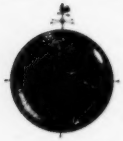
NORTH • EAST • SOUTH • WEST • IT'S SCHRAMM!

CHOOSE *as others have* THE MODEL THAT BEST FITS YOUR NEEDS!



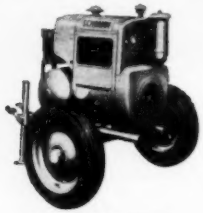
There's a Schramm Air Compressor, size and model, to meet your specific needs!

Below are listed some of the many Schramm models, portables ranging from 20 to 420 cu. ft. of actual air, the stationary ranging from 2 to 600 cu. ft. displacement.

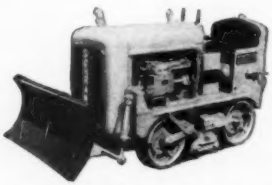
On all models performance records are evidence of their high quality. You will find the name Schramm written on every important page in compressor history.

Features you get in Schramm are: 100% water cooled, assuring ideal performance summer and winter; mechanical intake valve, forced feed lubrication, and electric-starter starting. All Schramms are compact, lightweight, easy to operate.

We invite you to write today for fully illustrated catalog describing in detail each of the Schramm Air Compressors shown here . . . plus a wide range of other models. We feel the Schramm story is a good one, and offers you a sure way to get your many compressed air jobs done quickly, efficiently, and economically.

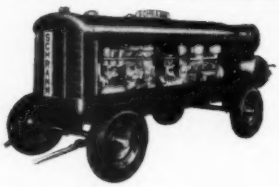


20/35 Model Compressor

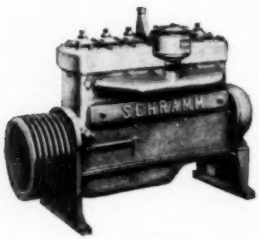


Self-Propelled with Hydraulic Backfill Blade

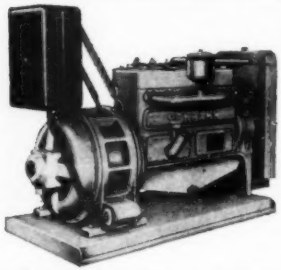
Skidded for Truck Mounting



Diesel Engine Drive



"V" Belt on Flat Pulley Drive



Built-in Motor Drive with Cooling Unit and Starter

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

LABOR DEVELOPMENTS *(continued)*

held to be the "reasonable" period contemplated by the NLRB and the Courts. (Mangel Co. and United Brotherhood of Carpenters and Joiners of America, NLRB)

EMPLOYER FOUND GUILTY OF REFUSAL TO BARGAIN

An employer was held guilty of refusing to bargain when after being asked to do so by the certified union, he contended that the NLRB unit determination was improper. The employer maintained that the NLRB's unit finding resulted in an unduly artificial and impractical group of employees because it excluded employees doing similar work in the general offices and that the unit finding should combine office and clerical employees at this refinery with the office and clerical employees at its general offices. The Board held that the employer's contentions were not valid, since these precise conditions were raised by the employer in the representation proceeding and were there litigated and decided adversely to the employer. (Continental Oil Co. and The Independent Oil Workers' Union of Oklahoma, NLRB)

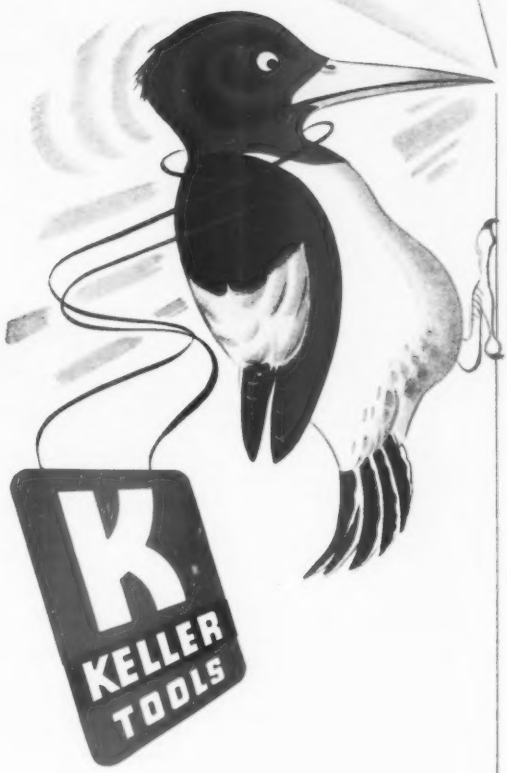
EMPLOYER FOUND GUILTY OF INTERFERENCE

Interference was found where an employer inserted a paid advertisement in the daily newspaper on the day following the closing of the plant, stating that it would be less costly to suspend operations than to bargain with the union. Such a statement, the Board found, was an implied threat of economic reprisal and therefore did not constitute protected free speech. (Goodyear Footwear Corp. and United Rubber, Cork, Linoleum and Plastic Workers of America; NLRB)

Similarly, interference was found where an employer attempted to deal individually and confidentially, offered individual wage increases, questioned an employee about union membership, and made threats of discrimination against union members. In holding that the employer's statement was not privileged free speech, the Board said: "It is impossible to estimate the effect of such anti-union activities on employees generally and the reasonable inference is that anti-union conduct of an employer does have an adverse effect on self organization and collective bargaining." (NLRB v. Ford Bros., CCA-6)

***LAYOFF OF STRIKERS JUSTIFIED**

An employer was justified in laying off five employees who by peaceful picketing induced a strike in violation of the no-strike agreement, even though the strike was caused by the



tools with a nose for close-quarters work

If you are a production manager, charged with selection of precision tools for work in hard-to-reach places, get in touch with Keller. In the extensive Keller line you'll find the tools for the job . . . compact, lightweight, small size. Keller-built tools are long-lived, designed with the fewest possible parts for low-cost maintenance. *If you are an assembly-line operator,* select Keller tools for work in close-quarter spots. You'll like the steady, powerful drive, the safety features. Keller tools are non-fatiguing, reduce assembly time.

KELLER *Pneumatic Tools*

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KELLER RATCHET WRENCHES

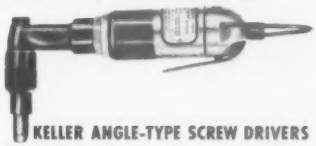
For use in confined areas. Sockets broached through, so wrench can be turned over and used for removing nuts. For automotive, aircraft, refrigerator, radio, other plants.

KELLER ANGLE-TYPE NUT SETTERS

Complete line of angle-type nut setters with short heads, straight or offset handles, or with 45° attachment. Ideal for setting nuts in awkward assembly operations. Powerful.

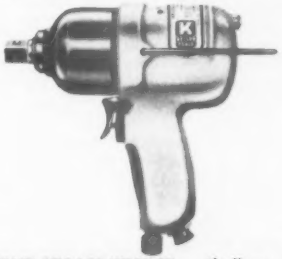
KELLER OPEN-END RATCHET WRENCHES

New open-end model for use in spaces where clearance is extremely scant. Fast-moving, easily handled tool. Eliminates tedious handwork. Especially recommended for drawing up flared fittings over flexible tubing.



KELLER ANGLE-TYPE SCREW DRIVERS

For high-speed screw driving in confined spaces. Straight or short handles. Fine for production assembly work in cabinetmaking, radio, and refrigerator manufacture.



KELLER IMPACT WRENCH . . . 4¾-lb wt

Small, easy-to-hold wrench, $\frac{3}{8}$" capacity. Sets nuts to desired torque without stalling shock. Positive impacting blows. Convenient for use in unusual positions.

KELLER IMPACT WRENCH . . . 9-lb wt

Powerful impact wrench with $\frac{5}{8}$" capacity. Ample power to set nuts ordinarily requiring nut setter many times its size. Simple, direct impacting mechanism. Reversible. Convenient suspension hook.

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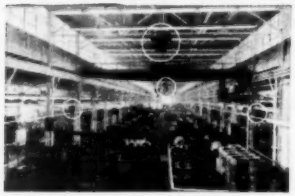
BUILDS HEATING EQUIPMENT
FOR ALL INDUSTRIAL APPLICATIONS

CONVECTORS FOR THE OFFICE Office of T. L. Fawick, President, Fawick Airflex Co., Inc., Cleveland, Ohio, showing Young Convector installation.



UNIT HEATERS FOR THE PLANT Fawick Airflex plant has "Vertiflow" Unit Heaters above craneway and Horizontal Units to heat areas with low ceilings.

● Young Convectors and Unit Heaters furnish an abundance of healthful heat where it's needed. For example: Young Convectors provide a steady flow of clean, warm air . . . circulated by convection, augmented by radiation . . . with quick response to modern thermostatic controls. Likewise, Young Unit Heaters, last word in design, tested in service, deliver large quantities of heat for any industrial application.

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LABOR DEVELOPMENTS *(continued)*

employer's unfair labor practice in discharging an employee for protected dual union activity. The Board held that the company's conduct did not excuse the union's breach of their agreement. Said the Board, "It would not effectuate the expressed purposes of the Act to regard this employer's unfair labor practice as sufficient justification for overriding the salutary objective of a no-strike clause." (National Electric Products Corp. and United Electrical, Radio & Machine Workers of America; NLRB)

EMPLOYER NOT ENTITLED TO CHANGE EMPLOYEE'S VACATION PERIOD

While an employer is authorized to change employees' vacation periods, he should give the employees reasonable notice of such change. In the instant case, it was only two days before the employee was supposed to take his vacation that the company cancelled it. The employee, after unsuccessfully trying to convince the superintendent that he planned his vacation long in advance, still took his vacation at the original time, and, upon his return, was suspended for two days. The company defended the suspension of the employee, claiming that because of a sharp turnover of summer help and shortage of employees, it had to deny the employee's request. The arbitrator pointed out that in some cases, "when changes do become necessary and are reasonably made, it is incumbent on the employee to recognize this and cooperate accordingly." However, the arbitrator held that the facts in this case were different, since the foreman waited over two months after being advised by the employee of the date of his vacation and only two days before he was due to leave cancelled his vacation, which was not a reasonable action on the foreman's part. (In re arbitration between Bethlehem Steel Co., Inc., and United Steelworkers of America)

*HOLIDAY COUNTED AS DAY WORKED FOR PURPOSES OF COMPUTING OVERTIME

Under a contract providing that holidays whether worked or not will be counted as days worked for purposes of computing overtime, an arbitrator ordered a company to continue its practice, established under identical provisions of prior contracts, of including a holiday as a day worked for weekly overtime purpose. While the company contended that overtime based on holiday hours not worked was inequitable and contrary to the industry practice, the arbitrator said, "Unless and until the contract is revised by the parties, past practice sets the custom." (In

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Q. Why UPWARD ACTION?

A. Only upward-acting doors give you full use, at all times, of all floor and wall space around entrances. They open completely out of the way, safe from wind damage, beyond reach of trucks or other vehicles.

Q. Why INTERLOCKING-SLAT DESIGN?

A. Kinnear's rugged, free-acting, interlocking-slat curtain *coils* into a small space above the door lintel—and can even be concealed in the wall in many cases.

Q. Why ALL-METAL CONSTRUCTION?

A. Higher protection . . . greater fire-resistance . . . longer life with less maintenance. Kinnear's steel-slat curtain features strength *plus flexibility—it absorbs many shocks and blows* that damage other types of doors.

Q. Why KINNEAR STEEL ROLLING DOORS?

A. For half a century, KINNEAR has combined all the above door advantages, providing highest efficiency at lowest cost to industrial and commercial users of every type. Kinnear Rolling Doors are available any size, for old or new buildings, with motor, manual or mechanical operation. Write today for complete information.

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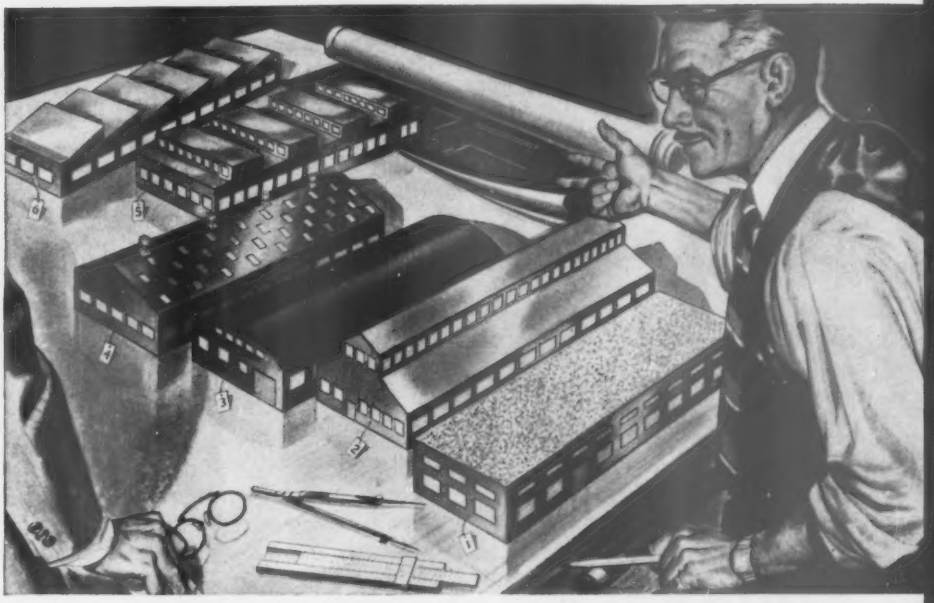
KINNEAR ROLLING DOORS

BUILDING COST = TIME + MATERIALS



NOW PROVED... roofs can be designed to cut the cost of a whole building in 2 ways

Independent engineering study analyzed six most common industrial roof designs and proved some roofs cut over-all cost of the whole building. All factors were considered in today's actual prices: materials, erection time, structural steel, other structural materials, comparisons of clear working areas, maintenance, greatest use of natural daylighting and gravity ventilation.

This complete study is now the exclusive possession of the Robertson Co., and is available to its customers. Write for a copy. Basic information every one should consider before starting any industrial building, regardless of size, location or purpose.

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GALBESTOS is a material-saving material you can use for repairs. It is protected sheet steel, proved absolutely without equal under the most severe weather, industrial heat and corrosion. Doesn't rust. Walk on it after years of service. Construction is dry, fast. Tested and approved by Associated Factory Mutual Fire Ins. Co., Boston, and the Underwriters' Laboratories, Inc., Chicago. Galbestos virtually eliminates maintenance! This time—get yourself a roof of steel, metal coated, with asbestos imbedded, bonded right into the metal, then impregnated with asphalt and waterproofed . . . GALBESTOS!

TOP-SPEED FASTENING* is a system of attaching roofing and siding entirely from outside, eliminating all interior scaffolding. The saving is so great that *the same number of men in the same time can apply twice as much material.* Your own men can use the new, Top-Speed Fastening tools.

TOP-SPEED INSULATION* is a new method for applying insulation entirely from outside. Again, no interior scaffolding. The labor saved by Top-Speed Fastening *pays for the labor needed to install insulation.* Therefore—if you want to insulate—you can do it the Robertson way merely for the cost of the material!

Write for Full Information in the Two Booklets "Galbestos" and "Top-Speed Fastening".

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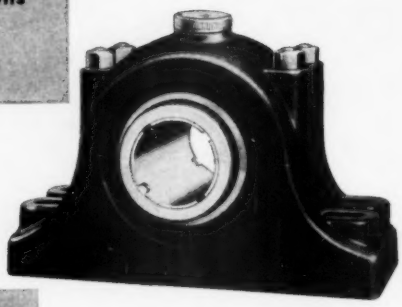

Mounted, sealed, housed, fully assembled, ready to lock on the shaft

Delivered from stock in 4 basic types and a vast range of sizes

"DODGE-TIMKEN" MEANS QUALITY!

100-TON PULL

Three Dodge-Timken Pillow Blocks carry the load of a 100-ton pull of castings in and out of a shot blast chamber for the Falk Corporation, at Milwaukee. The bearings save the gear reducer from side pull and allow the shaft to turn easily even while taking the full load. Perfect operation for 8 years to date.

It was Dodge who took the famous Timken Bearing, mounted it, sealed it, housed it and delivered a pillow block of new high quality—fully assembled, ready to lock on the shaft and carry the power loads of industry with new efficiency.

Power savings, improved machine operation, reduced maintenance, elimination of spoilage and steadier production—all result so regularly from the application of Dodge-Timken Bearings that this great line is widely accepted as the standard for comparison in up-to-date power transmission layouts.

Ask the Transmissioneer, your local Dodge Distributor, how these bearings and other Dodge "firsts" can help you achieve better, more economical production.

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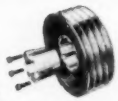
OTHER DODGE "FIRSTS" →



TAPER-LOCK V-BELT SHEAVES. Easy on—easy off—hold fast to shaft.

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"SC" BALL BEARING Pillow Block with new Neoprene metallic-backed seal.

DODGE of Mishawaka, Ind.

CALL THE TRANSMISSIONEER. Look for the name of the Transmissioneer, your local Dodge distributor, under "Power Transmission Equipment" in your classified telephone directory.

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FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

LABOR DEVELOPMENTS *(continued)*

re arbitration between Follansbee Steel Corp. and United Steelworkers of America)

EMPLOYEES NOT ENTITLED TO PAY FOR HOLIDAY WHICH FALLS ON SATURDAY

Employees are not entitled to pay for a holiday which falls on a Saturday outside of the regular work week, when the contract merely provides for pay for eight designated holidays and the union has operated under the same holiday provision for several years and has never before raised the instant question. In determining whether holiday pay was due the employees, the arbitrator said: "The decisive factor in this decision is not whether it is desirable or undesirable for employees to be paid for holidays on which no work is scheduled, but the intention of the parties in this respect as incorporated in the contract." Had the union made a claim in the past for remuneration whenever a holiday fell on Saturday outside of the regular work week, "it would have revealed at least its own intent for which it now contends." Since the contract language was ambiguous, the union's past silence on the question reveals the understanding or intent of the parties. (In re arbitration between M. E. Stern & Company, Inc., and United Optical Workers Organizing Committee)

***AUTHORITY OF ARBITRATOR**

An arbitrator has the authority to decide, after the termination of a contract, all disputes submitted to the grievance procedure during the life of the contract. Therefore, an arbitrator in settling a discharge dispute which arose under the contract, rejected the company's contention that he must limit redress for any improper discharges to the date the contract expired. The arbitrator pointed out that the right to relief becomes available as soon as the violation occurs, "and this right extends as long as the resultant injury continues, notwithstanding that in the interim the contract has expired." (In re arbitration between Armour & Company and United Packinghouse Workers of America)

***ARBITRATOR'S AWARD MAY NOT BE RECONSIDERED**

An arbitrator's award may only be reconsidered where his conclusion is at such variance with the facts that it constitutes a gross error and/or where new evidence of a compelling nature is disclosed. In the instant case, the arbitrator, in a prior award, had ordered reinstatement of an employee who was discharged for striking his foreman, pointing out that the employee had a long service

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a *first* essential to LOWER OPERATING COSTS

Because they insure economies in all major operating categories—materials, labor, power consumption, fixed charges and supplies.

Lubrication practices utilizing equipment that provides a *system* of lubrication designed for each particular requirement, contributes the ultimate to low operating costs by combining operating economies with increased production rates, quality control, and longer machine life.

You automatically improve your lubrication practices when you standardize on Lincoln lubricating equipment. This proven line offers you a selection, from a wide range of complete systems, for the periodic manual application of lubricants or for fully automatic, time-controlled, and powerized systems dispensing fixed quantities of lubricants at predetermined time intervals . . . Systems that effectively handle lubricants regardless of viscosity or temperature and deliver under positive pressure.

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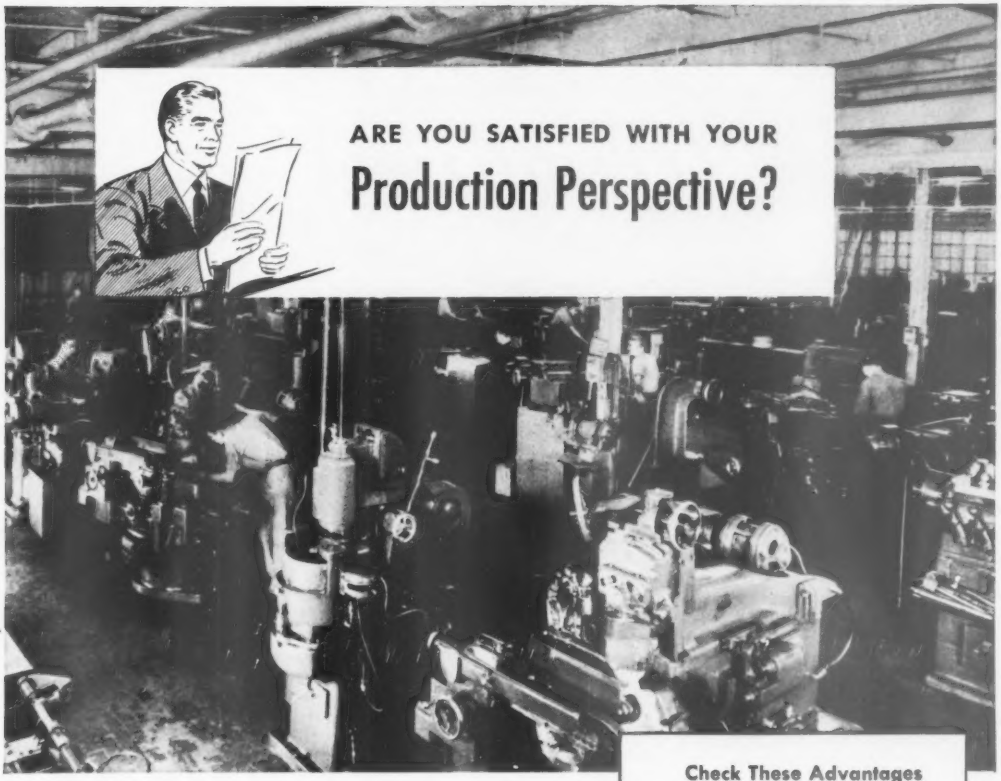
record of excellent work. The company claimed that the arbitrator's award was merely based on sympathy and would encourage other employees to disobey their supervisors. The company further claimed that the arbitrator in effect rewrote the discharge provision of the contract and substituted his judgment for that of the plant superintendent. In reviewing the entire case, the arbitrator held that his original conclusion did not constitute a gross error and pointed out that an arbitrator may substitute his judgment now and then as a natural part of the judicial process. "If the judgment of the arbitrator must always coincide with that of the plant superintendent, there is reason to question the role of arbitration in industrial relations." (In re arbitration between Swift & Company and United Packinghouse Workers of America)

*TWO-YEAR CONTRACT HELD NO BAR TO A NEW DETERMINATION FOR REPRESENTATIVES

Although normally a contract for a two-year term constitutes a bar to a new determination for representatives during its entire term, the Board held that such a contract is not a bar to a new election where only a small fraction of the expected complement of employees was employed at the time the contract was executed. In fact, it was pointed out that when the contract was signed, the employer had about 47 hourly paid employees and at the time the petition for election was filed, the employer had about 170 hourly paid employees. (Ball Bros. Co. of California, Inc., and Federation of Glass, Ceramic and Silica Sand Workers and American Flint Glass Workers Union; NLRB)

MANAGERS OF MEN'S SHOE STORES HELD NOT TO BE SUPERVISORS

The managers of men's shoe stores were held not to be supervisors within the meaning of the Labor-Management Relations Act when they did not have full control over hiring and tenure of employment, such authority being vested in the general manager who makes all decisions. The Board found that the duties of the store manager consisted of opening and closing the store, taking care of the stock book and store records, writing stock and factory production orders, making bank deposits, handling customer's complaints, and watching the selling floor to see that customers are properly treated. The store manager spends about 30 to 50 per cent of his time selling, for which he receives no commission. In contrast, the board pointed out that the general manager keeps in close touch with the men's stores, visiting each two



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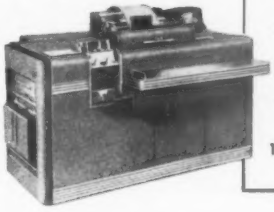
Production Perspective?

Perspective is defined as the "capacity to view things in their true relation or relative importance." Therefore, *Production Perspective* is the capacity to view each phase of production—from planning to completion—in its true relation to all other phases.

For easily formed, quickly interpreted pictures of all operations, business relies on reports and analyses with well-organized facts shown in their correct relationship.

Up-to-the-minute reports prepared on IBM Punched Card Accounting Machines classify the figures into well-defined pictures of any phase of production. This timeliness and organization of figures permits the utmost reliance on all production documents.

For clear, timely reports that command attention and give consistently effective results, look to IBM Accounting.



Check These Advantages of IBM Accounting

1. Permits maintenance of stocks at efficient levels.
2. Provides Stock Status report whenever needed.
3. Supplies current information on machine tool loads.
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SEE OUR CATALOG IN SWEET'S

What you want most in a door is easy, dependable operation—all day, every day—to keep traffic flowing in and out and merchandise on the move.

You want a door that spends a minimum of time waiting for the service man to arrive so it can get going again. Nothing's more useless than a door that isn't working! And, for that reason, you want a door that's backed by dependable service, day and night, week-ends and holidays, too.

For nearly 20 years Crawford dealers have been building business on that kind of door and that kind of service. All our dealers specialize in service on *any* make of door and many carry stocks of the most frequently needed replacement parts.

Next time your doors, regardless of make, need service, call the Crawford man listed under CRAWFORD DOOR SALES CO. in the Yellow Pages of your phone book. He'll get on the job—fast!

He'll be glad to tell you, too, about Crawford Doors, power operators, remote controls, and the energized "MARVEL-LIFT" which operates so easily that Crawford Doors up to 14′ x 14′ can be operated by hand.

A pleasure to send you literature on request.

Crawford DOOR CO.

409 St. Jean • Detroit 14, Michigan

LABOR DEVELOPMENTS *(continued)*

or three times daily in the course of a normal operating week, and he alone has authority to hire, discharge, promote, and determine salaries. (Florsheim Retail Boot Shop and Department Store Employees Union, Building Service Employees International Union; NLRB)

***EMPLOYER ENTITLED TO BY-PASS SENIOR EMPLOYEE IN PROMOTION**

Where a contract provided for the filling of job vacancies according to "seniority and ability to perform the job," an employer was within his rights in promoting a junior employee who was better qualified than the senior employee for the vacant job. The arbitrator pointed out that since the agreement provides for the consideration of both seniority and ability and the seniority of the employees in the instant case differed by only a few months, relative ability is determinative. (In re arbitration between Callite Tungsten Corporation and United Electrical, Radio and Machine Workers of America)

***VACATION PAY HELD TO BE AN ARBITRABLE SUBJECT**

The matter of vacation pay was held by the court to be an arbitrable subject since the contract provided for arbitration of disputes over wages. It was the decision of the court that vacation pay constitutes wages even though both subjects were treated separately in the contract. Said the court, "There can be little doubt that workers generally consider the money which comes to them as a result of their labors, whether it be regular pay, overtime, or vacation pay, as a part of their wages, and courts have recognized this fact." (Brampton Woolen Company v. Local Union, New Hampshire Supreme Court)

***PAY FOR TIME SPENT HANDLING GRIEVANCES**

Under a contract providing that management will pay for not more than a "reasonable" number of hours each week which stewards are required to spend away from their jobs, the company was allowed to insist that the stewards ring in and out when they leave their regular work to attend grievance matters. The arbitrator held that the agreement, by limiting the time a steward will receive pay while away from work, implies an arrangement to control time for which "there must necessarily exist also an agreement to adopt a workable method of recording the time." (In re arbitration between Jenkins Brothers and CIO's Mine, Mill and Smelter Workers)

More sawing every hour with RADIAL SKILSaw!

Straight ripping or bevel ripping is easy with Radial SKIL Saw. The operator simply slides the motor(s) along the rip fence for accurate cuts.

Rabbeting is another of the many operations you can make with Radial SKIL Saw . . . and you can be sure they'll be done right and to a production pace every time!

Radial SKIL Saw does more in less time. There's no time lost setting-up or changing jobs. All adjustments are made quickly and easily from the front. There's no support in your way. Radial SKIL Saw operates easily . . . with finger-tip control . . . means easier, faster production on all your jobs.

And Radial SKIL Saw is built to last. The best of materials . . . top engineering . . . finest design have been incorporated into every part . . . your assurance of long-lived low cost! Call Your SKIL Tool Distributor today for a demonstration.

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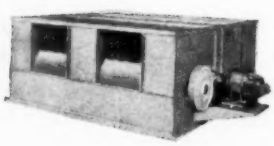
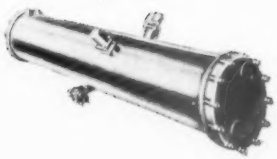


AIR HANDLING UNITS

UNIT HEATERS

CENTRIFUGAL FANS



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Positive new savings for every cubic foot of air moved! *No centrifugal fan has ever been built that will move air with as little power as the new Sturtevant Silentvane.* Efficiencies in excess of 80% are obtained over 37 per cent of the usual application range. *Peak efficiency now reaches 86%.* Check these five outstanding features:

1. **QUIET OPERATION**—because of the streamlined inlet and careful attention to smooth eddy-free air flow.
2. **INHERENT HIGH EFFICIENCY**—because of basic Silentvane design.
3. **TRUE SELF-LIMITING AND NON-OVERLOADING HORSEPOWER CHARACTERISTIC**—at any given speed.
4. **SPEED FLEXIBILITY**—for direct connection or belt drive.
5. **FREEDOM FROM DUST LOADING**—because of flat blade surfaces and fewer blades.

Here is the answer to your heating, air conditioning or industrial ventilating requirements. Call your Sturtevant office, or write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

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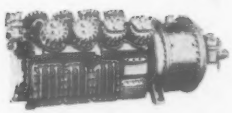
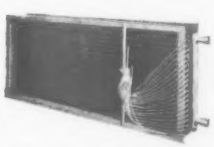


REFRIGERATION COMPRESSORS

AXIAL FLOW FANS



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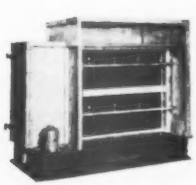

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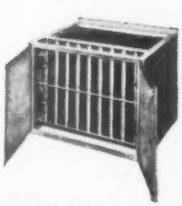

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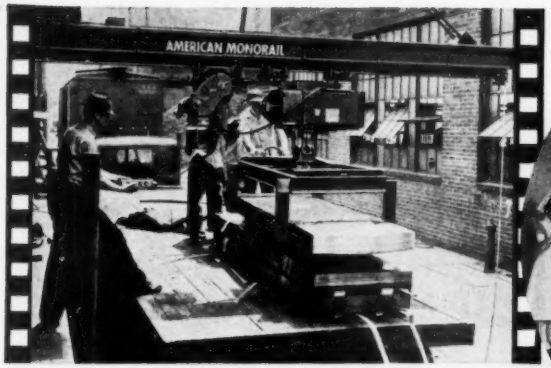
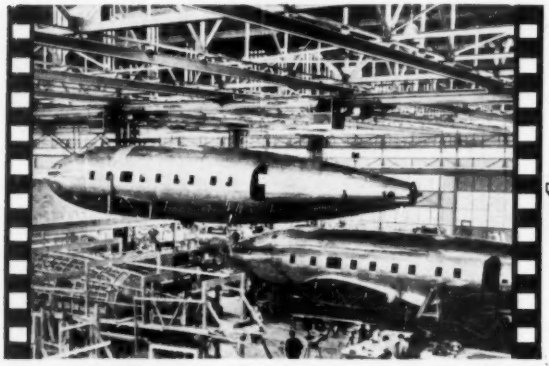
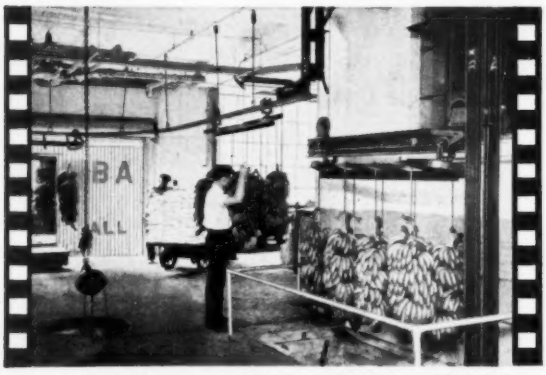


Another demonstration of the MonoTractor drive includes a swinging jib for passage of the carrier over a truck for removal of 2 ton bundles of sheet steel. An electric hoist and a Windsor sheet grab are used.

Polio patients are carried from dressing tables to exercise pool on Monorail system which includes a hand operated lowering device for easy operation by the nurse.



This twin-bridge 5 ton crane is 160 feet long operating on 9 runways. Two carriers, each centered between a pair of crane trucks, can make a lift of 10 tons as shown.



Fruit, unloaded from cars on special trolley racks, rolls around MonoRail curve to a drop section where the racks are lowered to basement tracks. The racks then roll by gravity to ripening rooms.

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before you decide upon any material handling equipment....

Our 16 mm black and white twenty minute sound picture will bring to you the complete story of American MonoRail overhead handling. If you are in the market for any material handling equipment, see our movie first. We will gladly loan you the film for showing in your offices at a time most suited to your convenience. Please drop us a line.

*UP and OVER is the title of our 20 minute 16 mm sound film.

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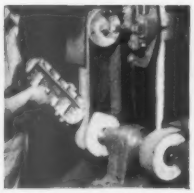

Guard raises, or swings clear, to expose any part of belt.

Platen in up-position provides flat working surface.

Easily made into a buffing machine, for many jobs.

With platen down, pieces are worked from under belt.

new!

Low cost! Portable! Takes little floor space! Does many metal-removing operations formerly requiring heavy, expensive machines!

DELTA® *Belt* Grinding, Polishing, and Deburring Machine

Can be used to do all this—and more!

• Clean out slots • Remove flash in corners
• Remove fins • Smooth up crowns • Remove nibs
• Remove parting lines • Chamfer corners

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without adjustable guards, dust chutes, motor, switch, or switch rod.

Price subject to change without notice.

Available in models to suit varying needs See Bulletin AD369

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DELTA MILWAUKEE®

You speed up flashing, grinding, cleaning, and polishing, with this new Delta *Belt* Grinding, Polishing, and Deburring Machine. You save time, labor, and material.

In this condensed unit on a welded steel stand, you get a production machine at low initial cost. With accessories to meet your particular requirements, it does hundreds of different jobs.

• There are no set-up wheels to bother with; no grinding wheels to dress. Instead, you use coated abrasive belts that are inexpensive, long-wearing, quick and easy to replace.

The Delta *Belt* Grinding, Polishing, and Deburring Machine is carefully engineered for long, trouble-free service. Delta quality features assure you of that: Preloaded, lubricated-for-life ball bearings. Precision-bored bearing seats. Dynamically-balanced pulleys. All-around rugged construction. Delta Dust Collector available for use with this unit protects workers' health and expensive machinery.

Make metal-removing fast and economical. Put Delta *Belt* Grinding, Polishing, and Deburring Machines to work for you on your production line—and in your inspection department, to clean up imperfections on the spot.

Have your nearby Delta distributor show you this new machine. Send coupon for free Bulletin AD369.

• *Ask your distributor about easy time-payment plan!*

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QUICKLY INSTALLED
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NO BATTERIES OR POWER SOURCE REQUIRED

To keep conversations strictly private — to elminate unintentional interruptions and eavesdropping — use Wheeler Self-Powered *Pair* Telephones as auxiliary communications units. You'll find them easy to install — as temporary or permanent additions to your present system — and they're maintenance-free. You'll need no batteries or other power connections.

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THEY SAY AND DO

Collective Bargaining Superior to Fraternalism

Another study of "The Causes of Industrial Peace" was recently released by the National Planning Association.

This report deals with relations of the Dewey and Almy Chemical Company, Cambridge, Mass., and its employees, represented by the International Chemical Workers Union.

According to investigators, fraternalism, which characterized the first few years of the relationship of the company and union, contributed first to strain, and later to a healthy, long-run relationship.

On the negative side, this fraternalistic attitude produced a childish and demanding reaction from the union. It fostered one-sighted bargaining. It was accompanied by an unrealistic belief by top management that employee gratitude and good-will would in themselves produce high productivity and sound relations. Even more important, this attitude led to an almost complete by-passing of the middle and lower management organization, and created considerable hostility toward the union and toward top management. When the tensions of this war were superimposed upon the situation, conflict became relatively acute.

On the positive side, the same fraternalistic attitude provided a setting which materially aided the early development of the relationship. The company president's friendly and warm relationship with the union was undoubtedly a major factor in the development of that confidence in the company which is so essential to the development of healthy relations.

The relationship gradually moved out of this fraternalistic phase and the management organization—having acquired the necessary attitudes and adequate skill—has assumed its proper responsibility for industrial relations. The process is not entirely complete even yet, but there are only a few traces of fraternalism remaining today.

The NPA committee found five reasons for the relationship at Dewey and Almy: 1. There was top management's early acceptance of the union and its sincere desire to develop a healthy relationship.

2. The development of skill and confidence, and the assumption of responsibility for industrial relations by the management organization down through the foreman.

3. Effective communications within the management organization and between the management and the union.

4. The degree of autonomy enjoyed by the local union.

5. The specific policies, practices, and procedures adopted. These are reflections of the underlying attitudes of management and the union. They are effects rather than causes.

33 Million Days Lost in 1948 Strikes

Figures recently released by the Bureau of Labor Statistics covering the first ten months of 1948, plus unofficial estimates for November and December, show that in the number of strikes, the number of strikers, and the time lost, there was not much difference between 1947 and 1948.

In 1947, plant idleness due to strikes was 34,559,000 man-days. In 1948, the estimate puts it at about 33,000,000 man-days.

These two years compare favorably with 1946, when the loss was 116,000,000 man-days.

Lincoln Electric Cuts Pay

Lincoln Electric Company has announced pay cuts of between 2½ and 3 per cent. Employees affected number 1089. Lincoln says the cut was made because of a drop in the cost of living index of the United States Bureau of Labor Statistics. Following settlement of a long-pending tax case (see FACTORY, January, 1948, page 208) Lincoln employees recently received a total of $3,821,973 in Christmas bonuses. This averaged 104 per cent of their pay. Lincoln Electric's yearly salaries, exclusive of bonus, average around $3500.

Industry Fights Rise In Break-Even Point

To fight the threat of a steadily rising break-even point in manufacturing, management is following a four-point program.

1. The wider use of improved machinery.

2. Efficient application of cost controls.

3. A drive for quality.

4. All-out production by employees throughout industry.

This information was recently released by the Associated Industries, a manufacturers' group in the Cleveland area, from a survey covering 103 manufacturers in and near Cleveland.

Of the companies surveyed, more than 90 per cent said they have utilized new and more efficient machinery since the end of the war. Complete retooling has been report-

HERE COMES THE

Trumbull Train

OF ELECTRICAL PROGRESS

A whole [illegible] of new Trumbull products is headed [illegible] new advancement in the entire line of Trumbull products — Flex-A-Power systems, Panel Boards, Control Centers, Switches and Motor Starters — all radically different. So watch for Trumbull's new product announcements during 1949. Here's the first —

A NEW

Magnetic Motor Starter and Magnetic Contactor

New, from top to bottom, Trumbull Starters and Contactors in sizes 0, 1, 2, 3 give maximum protection to motors up to 50 hp, 440 v. Look at all their important new advantages:

LONGER CONTACT LIFE —
Actual factory tests show the silver contacts on the Trumbull starter "make and break" for millions of operations — many times more than any starter on the market.

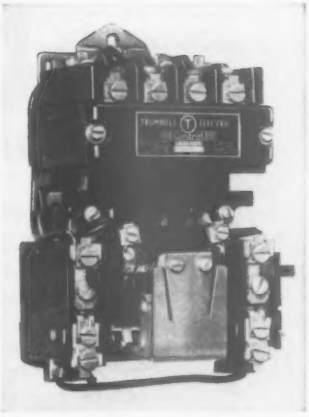
EASY TO MAINTAIN —
Silver contacts have permanently attached springs that are easy to remove. Terminals are located on the front and are easy to wire — a screw driver is all you need to disassemble starter — can be accomplished in less than a minute.

EASY TO INSTALL AND SERVICE —
Note convenient knockouts, large terminals, front connections, and ample wiring space.

GREATER PROTECTION —
Bi-metallic relay heaters follow motor's heating curve. Easily adjusted for automatic or manual reset.

BUILT TO LAST —
All parts resist corrosion and moisture. Examine plastic coil enclosure to see how the tough varnish impregnation protects windings. Contact points and cold-molded asbestos arc hood eliminate arcing . . . give clean "make and break" contact.

QUIET OPERATION —
Permanent lubricant impregnated in the plastic coil enclosure keeps magnet guides sliding smoothly . . . eliminates low voltage "chatter."



FOR MORE INFORMATION about this latest Trumbull development, write for Circular TEC 11. THE TRUMBULL ELECTRIC MANUFACTURING CO., Plainville, Conn. Other factories and offices throughout the United States. Foreign representation.

Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC

TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

LUNKENHEIMER VALVES Meet High Standards in Abbott Laboratories

Lunkenheimer Valves in the process lines at the fermenters used in the production of penicillin and streptomycin.

NOTED PHARMACEUTICAL MANUFACTURER SPECIFIES LUNKENHEIMER VALVES for process lines in its modern North Chicago Plant

IN the manufacture of the wonder drugs, penicillin and streptomycin, it's small wonder that Lunkenheimer Valves are included with other items of the finest-obtainable processing equipment. Intermediate compounds in the ratio of approximately five thousand units to one of finished product are flow-controlled by hundreds of Lunkenheimer Valves.

For dependability over long periods of service, these valves at Abbott Laboratories illustrate the way all phases of industry and commerce rely on Lunkenheimer Valves. This same low-cost service can be a profit factor in your operations.

WHETHER YOU'RE PLANNING a new plant, expansion of present facilities or modernization . . . you can specify Lunkenheimer Valves with utmost confidence. Available through Distributors in all industrial centers.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

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NEW YORK 13 CHICAGO 6

BOSTON 10 PHILADELPHIA 34

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ed by 8 per cent. This has permitted the installing manufacturers an increase in production of as much as 30 per cent.

Packaging Industry Report Published

A long-standing need for a centralized source of detailed information on the packaging industry has been fulfilled. The Department of Commerce recently announced that it will publish quarterly statistical reports on that industry.

The reason given by the Department for beginning this service is that the packaging industry has become a major basic industry in our economy.

Reports are available at a yearly rate of 60 cents. Address the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

New Record in 1948 Plant Outlay

A record of $18,840,000,000 has been spent on new plant and equipment during 1948. The Department of Commerce's recent announcement also pointed out that the 1948 total was higher by $2,660,000,000 than that for 1947. It stated that physical volume of construction was slightly below that for 1947, because of higher prices in force.

The outlay for new plant and equipment in the last quarter of 1948 ($5,010,000,000) was almost equal to the total spent in 1939.

Manufacturing corporations accounted for $8,180,000,000 of the 1948 total.

A survey by the Department indicates that industry will spend $4,400,000,000 in the first quarter of 1949 on new plant and equipment. This amount is about 5 per cent higher than for the first quarter of 1948.

Economic Advice For Future

DR. LEO WOLMAN, Professor of Economics, Columbia University, speaking before Congress of American Industry

I have some general propositions to lay before you, and they are perfectly obvious general propositions. They are not rules of conduct . . . but they are general ideas.

Let me put them before you. They are few. They are simple. The first is this: This is a time to save. This is a time to be parsimonious. If I were a leader of labor, I'd tell my constituents to save their money, even though that might reduce retail sales. This is the time to salt something away, to be saving, because you are going to need it and because economically it is a sound thing to do—to save more and spend

Rolling Steel DOORS

Manually • Mechanically • Power Operated

There's a Mahon Rolling Steel Door to meet your particular door requirement—whether it be manually, mechanically, or power operated, or an automatically closing Underwriters' Labeled Fire Door. Investigate the space saving advantages of these vertically acting doors, their permanence, and the greater protection they provide throughout a lifetime of trouble-free service. When you specify Mahon Rolling Steel Doors, you are assured the latest developments in doors of this type . . . you get more compact and more practical operators, with exclusive features which have proved very desirable in everyday operation. See Mahon Insert in Sweet's File for detailed information and complete specifications, or consult a Mahon representative.

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ANNOUNCING...
The New, FASTER DRYING
Sani-Dri
HAND AND FACE DRYER

BUILT-IN WALL MODELS AVAILABLE FOR NEW INSTALLATIONS

New, Improved Sani-Dri

CUTS DRYING TIME 25% OR MORE!

Now . . . a new, improved heating element makes Sani-Dri the fastest drying machine of its kind! This modern, sanitary method of hand and face drying now takes 25% *less time!* For new installations or modernizations of old washrooms, there's nothing like the new faster-drying Sani-Dri. Write for the latest facts today!

SAVES UP TO 85% OF WASHROOM COSTS!

You eliminate towels completely with the Sani-Dri. No unsanitary litter . . . no fire hazard . . . no paper clogged soil pipes! — Sani-Dri provides completely *automatic* drying service 24 hours a day, year after year with little or no maintenance! Sani-Dri *pays for itself out of savings!*

GET THE LATEST FACTS!
New brochure 1082 shows both built-in wall and pedestal models of new faster-drying Sani-Dri electric hand and face dryer. Write today!
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less. I don't know, but I think it can be done.

This is also a time—and is my second proposition—to begin to think about cutting costs, hard as that is to do. Not to think about it, but I mean to do it. I don't think, if you get cooperation, that that's an infinitely difficult, an insuperable matter. So far as we are able to tell . . . there is a great margin of inefficiency in the United States. I think that is correct. There is a great margin of inefficiency. If you just got to work on that margin of inefficiency—I mean cooperatively—you probably could save a lot of money. Inefficiencies are always associated with inflations. It is time to begin to think of getting rid of these inefficiencies and to save some costs of doing business. . . .

And then my third proposition is a perfectly terrible one, but is my last, and it is this: If we get into trouble, what we ought to do—and here's where you need cooperation of the first order—what we have to try to do is to make the depression or the recession or the adjustment or the correction—you see I am giving you the option of choosing the word that is more pleasant than others—to make it as brief as possible, and the only way to make it brief is to cooperate and to cut away the dead wood, which means to work a little harder, to cut out carelessness, to cut out waste, to cut out excessive costs—or, to put it this way—to cut out the things you can no longer afford.

So my third piece of advice is that if we, by some stroke of fate, fall into one of these situations which I have been giving these various names to, the effort should be not to ask somebody to bail you out, because that will make it worse. That is a foregone conclusion.

When and if the American people again reach the point where they are going to ask the government to save them from themselves, that's going to be bad. It is to the interest of everybody in the United States, in business, in industry, among labor, and in the general public, to learn what these questions are like and to solve them by their own efforts. If they don't solve them by their own efforts, they are going into something much worse.

Wages and Prices

The following is a quotation from the article, "Union Responsibility Based on Information," in Labor's Monthly Survey, published by the American Federation of Labor, November, 1948.

Labor's primary objective is to improve living standards, but this cannot be done if price rises cancel wage gains. The income to pay wage increases without raising prices must be created by increasing the real

ECONO-RACK
INCREASES YOUR STORAGE SPACE AS MUCH AS 50%

THE RUGGED, FLEXIBLE, MODERN STORAGE METHOD

For storage of bar steel, plates, palletized material, etc., Econo-Rack has a wide range of uses. Saves space, provides easy access of stock, simplifies inventory. **PROMPT DELIVERY.**

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New kind of bushing stock . . .
***your key* to new savings!**

HERE'S WHY. Shenango-Penn tubular bushing stock is *different!* It's *centrifugally* cast! Now, in a complete range of stock sizes, ready for immediate delivery, Shenango-Penn bars offer you those *same* money-saving qualities that make Shenango-Penn a preferred source of supply for special bearings, bushings and sleeves that must withstand the toughest kinds of service.

ADVANTAGES. The Shenango-Penn *centrifugal* method produces pressure-dense bars having exceptionally fine grain, higher tensile strength, finely divided and uniform lead dispersion, greater elongation, and *complete* relief from sand inclusions and blow holes. So naturally you can count on fewer rejects, excellent bearing load distribution, superior wear-life, and less chance of breakage or distortion in service.

FREE BULLETIN. Send for Bulletin No. 145 containing additional information and the complete list of standard, conveniently stocked sizes. These bars are ready now to give you that big *extra* margin of safety, service-life and over-all economy.

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THEN WHY BUY A GROSS OF ASSORTED WIPING CLOTHS?

KEX Industrial Wiping TOWELS are important tools—designed, like any special tool, for a specific purpose.

They aren't makeshift . . . they aren't discards that have outlived their original usefulness. They've been designed from their beginning to do your important wiping jobs, carefully, efficiently and economically.

KEX Industrial Wiping Towels are:

1. Actually precision items for wiping purposes *only*.
2. Soft, woven cotton with no abrasives to mar delicate surfaces.
3. Bound at the edges for safe use.
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5. Scientifically cleaned by special high heat to remove all soil.
6. Rented—nothing to buy, no expensive inventory—just a low monthly rental charge.

Kex Towels are delivered in neat bundles, in desired quantities for easy storage, convenient handling and control of distribution. See your classified telephone directory for nearest KEX Distributor, identified by this trade-mark.

Or write for details, to KEX INDUSTRIAL SERVICE, 295 Fifth Avenue, New York 16, N. Y.

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value produced per man-hour of work. This does not, of course, call for speed-up or incentive systems, for such schemes are less effective than union - management cooperation. It does require intelligent planning on the part of management and labor to improve production methods, develop better team work, reduce waste, cut overhead costs, install better machines, etc., with informed collective bargaining to assure workers increased compensation for increased output. . . .

A business concern exists for the purpose of creating wealth. Out of the wealth created (goods or services produced and sold for cash) the firm pays its costs of operation, the wages and salaries of workers and management who invest their work in the business, the dividends to stockholders who invest their money in it. It also provides for its own future, for increased production, for emergencies, etc. A price increase creates no wealth. Therefore, wage increases paid for by raising prices are cancelled in the long run by higher living costs.

Every business plays its part in supplying a growing American population with a rising standard of living. This means that it must not only create wealth, but create more wealth year by year. Otherwise, it cannot pay the increased real wages necessary to raise living standards, or provide the increasing volume of goods to be bought with these wages.

Eight Cost Problems

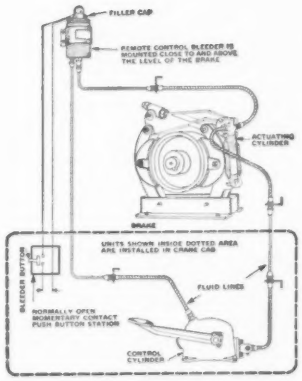
Attempts by production executives to lower costs and increase output and quality are faced with eight pressing problems, according to a survey of 1000 companies by the American Management Association:

1. Insufficient employee interest in increased production.
2. Inability to meet customer deliveries because of uncertainty of deliveries from suppliers.
3. Maintenance inefficiency, causing time lost for repairs.
4. Less than maximum effectiveness in physical handling of materials in the manufacturing process.
5. Inadequate leadership by foremen and supervisors.
6. Lack of sufficiently close coordination between production engineering and sales.
7. Inadequate inventory controls in scheduling full use of equipment for plants producing a wide variety of products.
8. Interruptions of production where design changes rapidly.

Another interesting fact was that almost every response to the survey indicated company concern about a lack of employee interest in increased production, even when incentive plans are offered.

HYDRAULIC BRIDGE BRAKES did the trick....

and only Wagner Crane-Bridge Brakes give you these features:


FILLER CAP
REMOTE CONTROL BLEEDER IS MOUNTED CLOSE TO AND ABOVE THE LEVEL OF THE BRAKE
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BRAKE
UNITS SHOWN INSIDE DOTTED AREA ARE INSTALLED IN CRANE CAB
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- **A Size and Type for Every Application . . .**

Wagner hydraulic crane-bridge brakes are built, with or without parking attachment, in four sizes that are capable of handling any application—from light industrial cranes to the largest steel mill ladle crane.

- **Remote Control Bleeder . . .**

Keeps lines full of fluid, even when brake is installed at a considerable height above the control cylinder. Maintains peak braking efficiency, and makes bleeding the system an easy, "one man" job.

- **Self-Centering Device . . .**

Prevents brake shoe drag by assuring equal clearance of *both* brake shoes.

- **Other Advantages Include . . .**

Power failure braking . . . one-point shoe adjustment . . . 200% emergency torque . . . grease fittings for lubrication . . . non-scoring, easily replaceable molded lining blocks.

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If your cranes are not equipped with Wagner brakes, one of our field engineers will gladly show you how simple it is to install a modern hydraulic system.

If you now have Wagner brakes, your system can be quickly modernized with our complete conversion kits. You can change your old solenoid-controlled HM brake to the compact, hydraulic type; you can convert a type H brake to an HM; and you can easily add the remote control bleeder to any Wagner system.

Bulletin IU-40 gives full information on Wagner Industrial Brakes—write for copy.

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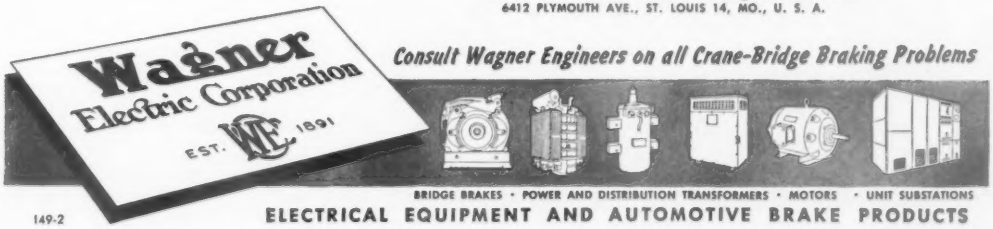

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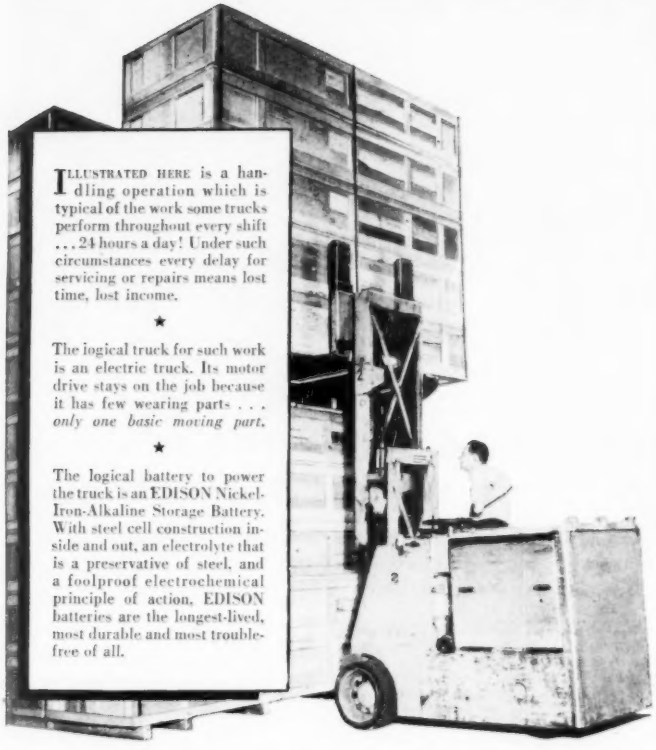
How *continuously* it works is what counts



ILLUSTRATED HERE is a handling operation which is typical of the work some trucks perform throughout every shift . . . 24 hours a day! Under such circumstances every delay for servicing or repairs means lost time, lost income.

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The logical truck for such work is an electric truck. Its motor drive stays on the job because it has few wearing parts . . . *only one basic moving part.*

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EDISON batteries give you many advantages: they're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle. Get a current EDISON price quotation—you will probably find initial cost MUCH LOWER than you think. Couple this factor with well-known EDISON long life and you will have the key to year-after-year economy.

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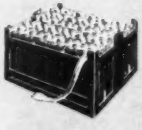

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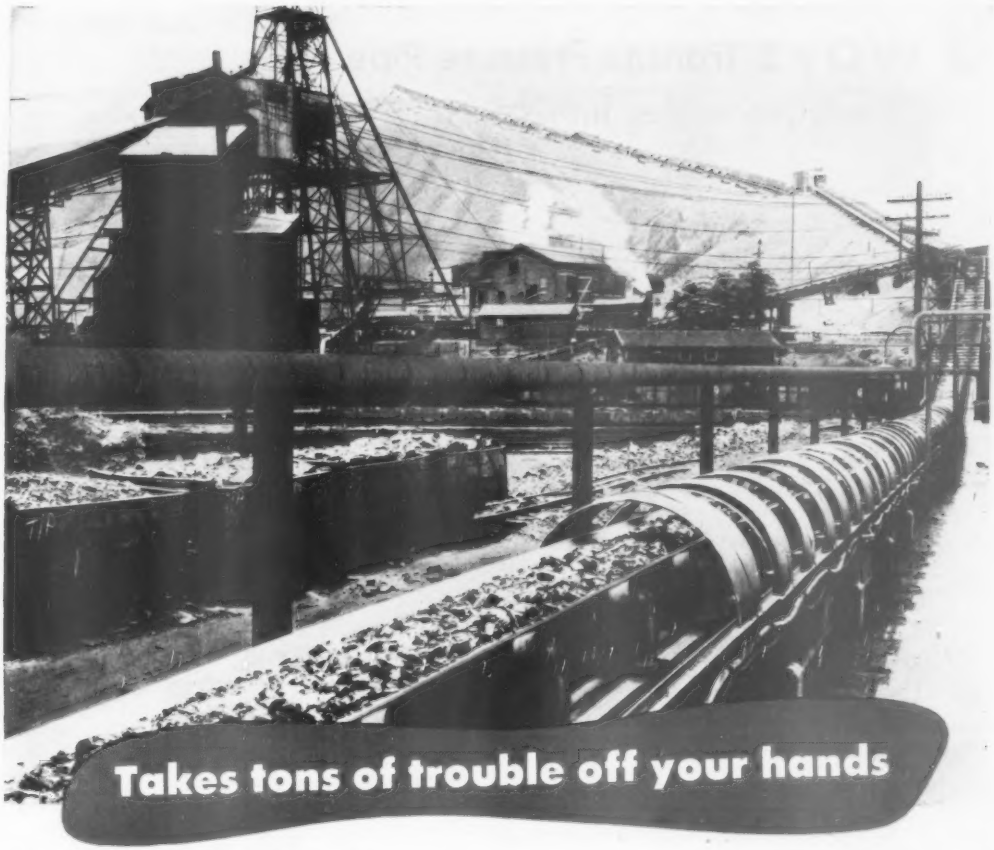
BEHIND THE BYLINE

Facts About *Factory's* Authors

Edward G. Hart (page 88) is a chemist by training and experience. Born in Gwinn, Mich., he received his B.S. in chemistry at Michigan State College in 1940 and his M.S., also in chemistry, at Indiana University the following year. For four years he was associated with Dow Chemical Company as research metallurgical chemist. In 1945 he joined The Arco Company, where he is now plant engineer. He is a member of several technical and trade societies, including the American Chemical Society and the Materials Handling Institute. His hobbies are hunting, fishing, and other outdoor sports.

Otto Keller (page 103) was born in Switzerland, but all his formal education has been received here in the United States. For five years he was associated with American Brown-Boveri Electric Corporation, in Camden, N. J. For the past 17 years he has been working with Allis-Chalmers on various commercial and technological aspects of mercury arc rectifiers. His position there today is that of application engineer.

James C. Forbes (page 110) joined the engineering division of General Electric's lamp department in 1937, the year after graduating from Cornell. He worked on office and hotel lighting until 1941 when he went into the Army. During the war he was connected with the training of units for field combat operation. Upon his release in 1945, he returned to Nela Park where he went back into his work in the industrial lighting field. He has recently been transferred to the New York Sales District as supervisory engineer. His article,



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Once you see this belting in action, you'll understand why thousands of other wide-awake engineers specify Hewitt for all their belting needs.

You will find, as they have, that you can depend on Hewitt Conveyor Belting for your unusually severe operations. That's because it handles heavy abrasives, like ore and rock—or wet, gritty materials, such as fines and slag, with ease. In short, it is extremely strong belting—built to take tons of trouble off your hands.

You can get Hewitt Belting for all of your needs: Maltese Cross for the really tough jobs, Ajax for general service, and Conservo for lighter applications and portable conveyors. Remember, too, that Hewitt-Robins is the only firm that offers you single responsibility for your entire belt conveyor system.

For engineering services consult Robins Engineers Division, 157 Chambers St., N. Y. For machinery, write to Robins Conveyors Division, Passaic, N. J. For belting, Hewitt Rubber Division, Buffalo 5, N. Y.

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MORE REASONS WHY HEWITT BELTING PROVIDES LONGER SERVICE AT LESS COST

- Hewitt Belting is fully protected to resist moisture, oils, flexing, and ply-separation. It is also treated against mildew.
- Abrasion-resistant covers are made of extra-tough rubber. Rigid-edge construction prevents edges from curling if the belt becomes misaligned during conveying operations.
- Heavy textile reinforcement gives Hewitt Conveyor Belting unusual strength combined with high flexibility.
- You can get these leading types of belting to handle every kind of conveyor service: Maltese Cross for severe jobs, Ajax for general service, and Conservo for lighter applications and portable conveyors.

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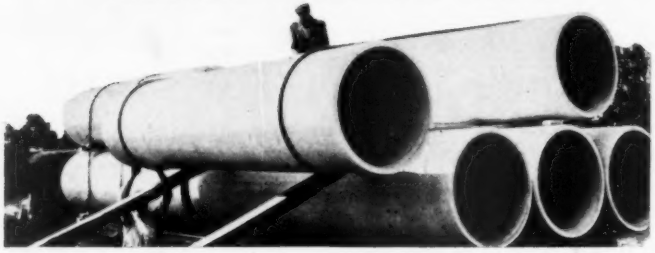
3 ways Transite Pressure Pipe reduces water line costs



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DEFLECTIONS: Deflections up to 5 degrees at each joint are possible in Transite water lines. Flexible Simplex Couplings permit laying pipe around curves and obstructions without special fittings.

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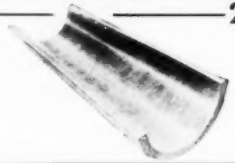

MAXIMUM FLOW—LOWER PUMPING COSTS: The smooth interior of Transite Pressure Pipe assures minimum friction loss, maximum flow. And because Transite is made of asbestos and cement, it cannot tuberculate and lose its high flow capacity. Pumping costs, as a result, stay low.

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RESISTS CORROSION: Installations in cinder fills, salt marshes, etc., prove Transite's high corrosion resistance. Furthermore, Transite Pipe cannot rust . . . cannot cause "red water."

WITHSTANDS VIBRATION: A Transite line is protected by Simplex Couplings . . . each a flexible "link" that helps the line absorb stresses and vibration—safeguards against costly leakage.

For additional facts about Transite Pressure Pipe, including engineering data, write Johns-Manville, Box 290, New York 16, N.Y.

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TRANSITE PRESSURE PIPE

for Water Supply Lines • for Fire Lines • for Process Lines

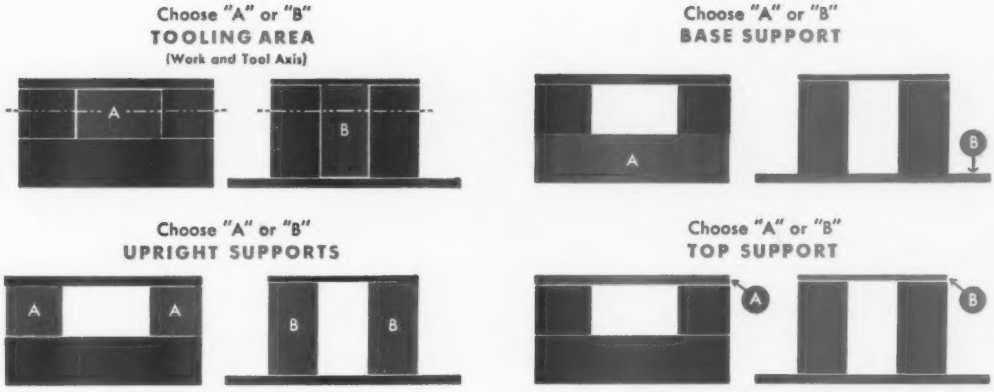
BEHIND THE BYLINE (continued)

"How To Figure the Cost of Light," appeared in the April, 1947, issue of FACTORY.

Clarence E. Albert (page 116) graduated from Pullman Tech High School in Chicago, and later took a 2-year course in Personnel Management and Labor Law at Armour Institute and DePaul University. His business career started with a job as air brake repairman for the Michigan Central Railroad. During the depression he worked for a period as a mechanic for the Truck Equipment Manufacturing Co., and in 1934 began at United Specialties as a spot welder. After working with this firm in various capacities, he was made personnel director, his present position, in November, 1942. He says that he is particularly interested in golf, bowling, and baseball.

J. Allen Wood (page 118) was born and educated in Baltimore, Md. He worked for several years as a salesman, and as county circulation manager for The Baltimore Post. He joined the Conservation Department of the Glenn L. Martin Company in 1942, and has been successively methods leader, head of conservation at the Martin Company's Plant No. 2, assistant to the factory manager, and new chief of conservation. He collects stamps, antiques, and books.

Roy L. Rollins (page 124), manager of personnel at A. E. Staley Manufacturing Company, was born in Springfield, Ill. His whole experience has been with this company, where he started working during vacation periods. After graduation from Millikin University in 1933, he joined the Staley personnel department, and ten years later was promoted to his present position.



HOW GOOD ARE YOU ON MACHINE DESIGN?

The all-round efficient service given by any machine tool, and the opportunity for its improvement and development, usually depend on advantages afforded by its basic design. Before purchasing a machine it will pay to look for the advantages or disadvantages of its basic design.

	MACHINE #1*	MACHINE #2	MACHINE #3	MACHINE #4	MACHINE #5
WORK & TOOL CAPACITY	✓				
WORK & TOOL SUPPORT	✓				
WORK & TOOL MAINTENANCE	✓				

*CONOMATIC

Any good investment has certain qualifications that prove it profitable. The wise investor and smart banker have some sort of measuring stick to analyze every investment they make.

Why not use a measuring stick to chart your purchases of Automatic Bar Machines? If you are already using a chart, perhaps you would like to compare it with the one that we have prepared. Write to us for a copy or ask the Cone representative.

Above are illustrated two types of frame design of Multiple Spindle Automatic Bar Machines. Assuming that the Tooling Area is important — and is as efficient as the frame around it permits — which of the two designs would you choose to meet the following requirements?

WORK & TOOL CAPACITY

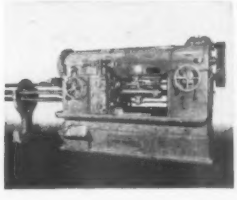
Long, open, roomy Tooling Area and long main end slide for handling longer work and for clearing die heads in threading, etc., to the full collet capacity of the machine; for heavy cross-slide cuts, deep hole drilling, and general all-round work with HSS or Carbide Tools.

WORK & TOOL SUPPORT

Genuine, horizontal, rectangular box-frame, free of overhang; heavy-set, rigid upright members for supporting head-stock and gear box units between heavy, full-length top and base members, for substantial support of all work and tools close to the work and tool axis, and for the maintenance of accurate alignment of work and tools.

WORK & TOOL MAINTENANCE

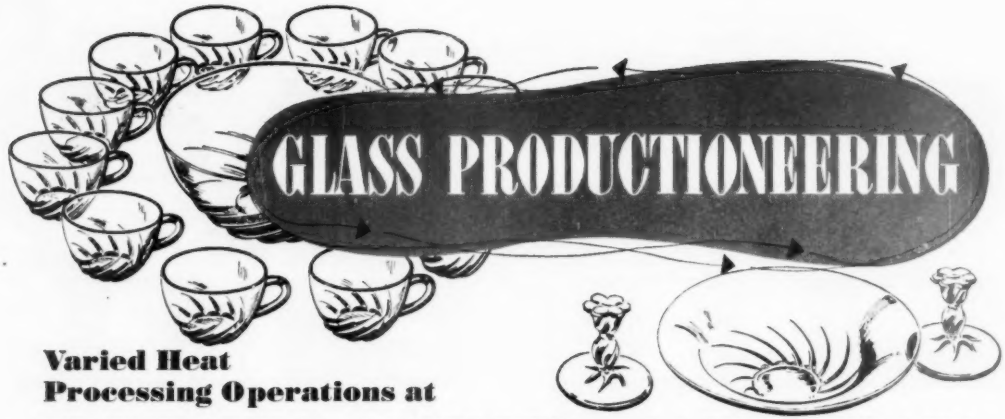
Heavy, strong, well supported, overhang-free, vibration-free, liberal bearing, convenient, adjustable, work holding units and tool slides, with accessible chip-free cams, with adequate capacity in base member for chip disposal and cutting coolant.



A comparison with ALL Automatics will lead you to

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.



GLASS PRODUCTIONEERING

Varied Heat Processing Operations at

THE DUNCAN & MILLER GLASS COMPANY

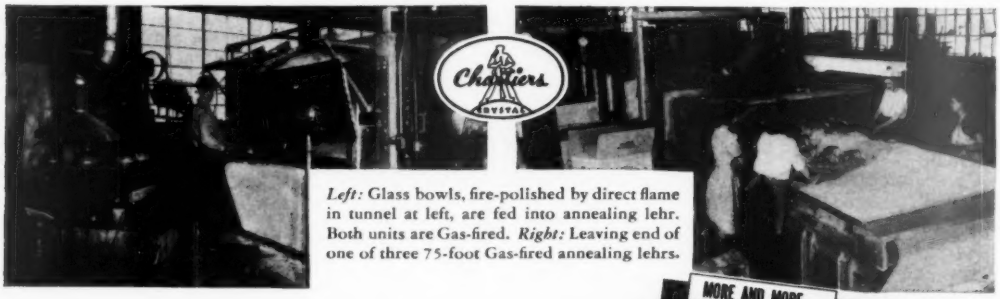
Emphasize Versatility of GAS

CHARTIERS *Symphony*, latest of the Duncan antiques-of-the-future patterns, is an outstanding example of fine glassware designed for manufacture by production methods. In the new Chartiers Division plant of the Duncan & Miller Glass Company, Washington, Pennsylvania, continuous cycle equipment has been installed to streamline the many operations of modern glass-making.

Of course, the melting and heat processing units in this production-line are Gas-fired. Batch tanks, fire-polishing tunnels, annealing lehrs, and molding tables utilize the productive flames of GAS at many different temperatures.

This controllability is one of the most essential features of GAS but Sales Manager Robert B. George of Chartiers Division emphasized the importance of fuel cleanliness in the production of crystal-clear glass. In addition, Mr. George pointed out that the economy of GAS was a vital factor in their cost-control.

During 84 years of pioneering in fine American glassware, the Duncan & Miller Glass Company has developed many techniques for applying GAS in hand-made and continuous-cycle glass manufacturing. Their experience is a simple demonstration of the flexibility of GAS and the simplicity with which it can be applied in modern glass productioneering. You'll find it worthwhile to investigate the heat processing capabilities of GAS.



Left: Glass bowls, fire-polished by direct flame in tunnel at left, are fed into annealing lehr. Both units are Gas-fired. *Right:* Leaving end of one of three 75-foot Gas-fired annealing lehrs.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE NEW YORK 17, N. Y.

Porto-Power* Gives You TONS of Controlled Hydraulic Power Where... When... And How You Want It

S-79 Heavy-Duty 20-ton Porto-Power kit includes hydraulic unit and a basic assortment of attachments for a wide range of industrial maintenance, production, and assembly jobs, and construction work.

S-31 10-ton Industrial Maintenance Kit—a popular assortment for mills, mines, factories, machine shops and construction projects. Hydraulic Unit and attachments have versatility and capacity for all general work.

SA-16 2-ton Bantam Porto-Power assortment contains a complete selection of 23 attachments and compact hydraulic unit. A utility assortment for work requiring moderate force or for compact quarters.

P-182 Electrically-Driven Hydraulic Pump. Converts hand-operated Porto-Power to power operation. Handles one to 25 rams — speeds pipe bending and other work. Single control knob! Also adaptable to special installations.

S-36 and S-30A Pipe Benders work with hand-operated units or fast P-182 pump. Bend conduit and heavy-duty pipe from 1" to 4" in diameter without heat or auxiliary equipment.

Wedgie is a crevice and tight-quarters specialist. Works with standard 2-ton Bantam, or 10-ton Porto-Power pump. Solves problem of getting controlled power into otherwise inaccessible spots.

Z-258 Press for 10-ton Porto-Power ram. Has special brackets for mounting on bench. Makes a durable, practical shop press for production operations and maintenance jobs.

S-80 50-ton Porto-Power unit and Z-319 Toe-Lift Sleeve. Handles the big jobs. Weighs only 110 lbs. Easily carried by one man. Toe-lift slips over ram — permits safe, easy lifting of transformers and other heavy machinery.

S-76 This 7-ton hydraulic Porto-Power unit includes standard 10-ton Porto-Power ram and special 7-ton short ram. Used in small restricted space where power and compactness are needed.

PORTO-POWER'S VERSATILITY CUTS YOUR PRODUCTION AND MAINTENANCE COSTS

Porto-Power works everywhere! With its hydraulic unit and scores of attachments, Porto-Power can do everything the human hands can do — but with *tons of power*. It can lift, bend, spread, clamp, press, push and pull. And Porto-Power increases in *earning* power, too. Blackhawk continually adds new attachments to your existing Porto-Power equipment. It will pay you to order Porto-Power from your Blackhawk Industrial Supply Distributor Now!

***A Product of* BLACKHAWK MFG. CO.**

Dept. P-2729, Milwaukee 1, Wisconsin

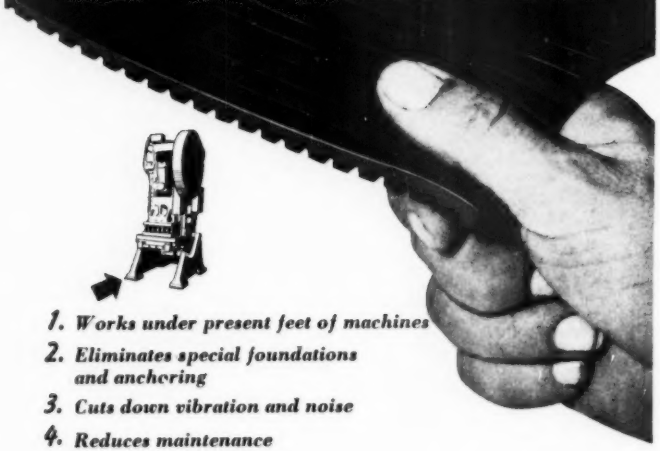
BLACKHAWK

HAND JACKS — WHEELED JACKS — WRENCHES — PORTO-POWER — RECK-RACK

MODERN BASE FOR MACHINES!

MB's ISOMODE* PAD helps you

CUT OPERATING COSTS!



1. *Works under present feet of machines*
2. *Eliminates special foundations and anchoring*
3. *Cuts down vibration and noise*
4. *Reduces maintenance*

It's the vibration of machines (or their impact) that creates so much extra expense in a plant. So often it's the cause of damaged plaster and floors. You'll find it responsible for rapid loosening of machines, interference with precision work, nerve-wracking noise level even in offices far removed from the factory floor. And all so needless now! For you can take the wear and tear out of vibration easily, quickly, cheaply — with Isomode Pads!

See that cross-cleated construction? It was engineered that way for the special resiliency required to cushion impact and vibration *effectively*. Though only 5/16" thick, Isomode Pads are all you need to anchor your lightest machines, your heaviest ones. No expensive built-up bases, no bolting to floors, no costly job when it comes to relocating equipment! A heavier machine simply gets supported by a larger area of pads.

Molded of Neoprene, Isomode Pads resist oil, water. Place them under your machines and forget them for years. They are supplied in sheets 18 x 18 inches square to be cut to necessary size by your maintenance crew. Each pad is enough for a total of 9½ tons of machines!

IN THOUSANDS OF INSTALLATIONS, Isomode Pads are now cutting plant costs and improving working conditions for satisfied users. Why not learn what they can do for *you?*

SEND FOR THIS DETAILED BULLETIN

It tells you about more benefits, and shows how easy it is to install Isomode Pads.

*Trade Mark Reg. U. S. Pat. Off.

THE MB MANUFACTURING COMPANY, INC.
1080 State Street, New Haven 11, Conn.

BOOKS

Motion and Time Study

RALPH M. BARNES, M.E., Ph.D., Professor of Industrial Engineering and Director of Personnel, College of Engineering, University of Iowa. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 550 pages. Photographs, sketches, diagrams, sample forms, floor plans, charts, tables, graphs; appendixes A, B, C; bibliography; index. $5.

This is a third edition of a book originally written to report techniques in finding methods of greatest economy and for measuring labor accomplishment. The entire book has been revised on the basis of a recent survey of 80 factories. It is fully illustrated with action photographs showing hand motions, and presents case histories as examples of application of principles involved. Five new chapters have been added, covering process analysis, gang process charts, activity charts, and man and machine charts. New material on rating operator performance, the effect of practice, and motion and time study training programs is also included.

Labor in the American Economy

WILLIAM STEPHEN HOPKINS, Professor of Economics and Director of the Institute of Labor Economics, University of Washington. McGraw-Hill Book Co., 330 West 42nd St., New York 18. 368 pages. Tables, charts, references, appendixes I to IV, index. $3.50.

Although this book is intended for use as a text, it is written in an informal style, as the author says that "the subject itself is lively, informal, and very human," and he has "thought it appropriate to set the style to match the subject matter." He does not present a mass of statistical matter, as figures go out of date. He discusses various labor problems as interrelated phases of today's labor-management relations. He omits any extended discussion of theory, or of labor law, as he feels these subjects are adequately covered elsewhere. The material discussed is divided into three parts: Labor Problems; Collective Bargaining; and Labor, Management, and the Public.

Industrial Hygiene and Toxicology

Edited by **FRANK A. PATTY,** Director, Industrial Hygiene Service, General Motors Corporation. Interscience Publishers, Inc., 215 Fourth Ave., New York 3. 531 pages. Photographs, sketches, tables, charts, graphs, diagrams, subject index. $10.

This is the first of two volumes

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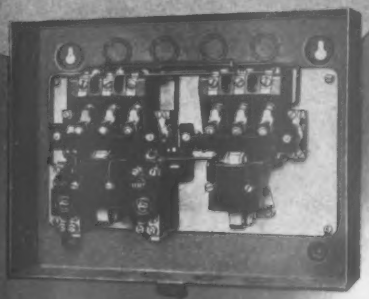
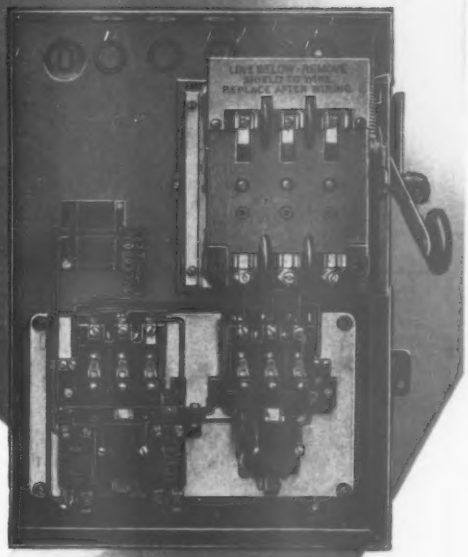
FOR A. C. MOTORS REVERSING APPLICATIONS



● Bulletin 6030 Reversing Starters consist of 2 A. C. Contactors mechanically interlocked to prevent simultaneous closing of both contactors. Available in sizes 0 through 6 for standard reversing applications and sizes 0 through 4 for plug-stop or jogging duty. NEMA Type 1, 1A, 4 and 5 Cabinets.



Bulletin 6040 Reversing Starters have 2 contactors for making and breaking the power circuit, a Circuit Breaker for short circuit protection, and an overload device. Available in sizes 0 through 5 for standard reversing applications and sizes 0 through 4 for plug-stop or jogging duty. NEMA Type 1, 1A, and 5 Cabinets.

Bulletin 6038 Reversing Starters consist of 2 A. C. Contactors for making and breaking the power circuit to the motor, a disconnect switch for isolating the circuit, and an overload device. Available in sizes 0 through 5 for standard reversing applications and sizes 0 through 4 for plug-stop or jogging duty. NEMA Type 1, 1A and 5 Cabinets.

All of these starters for plug-stop and jogging duty use two of the normally open Control Circuit Contacts for electrically interlocking the reversing contactors.

Write for Clark Bulletins 6030, 6038 and 6040

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131% of the funds invested in Jones & Lamson Turret Lathes were repaid to the purchaser in one year of operation.

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MACHINE TOOL CRAFTSMEN SINCE 1835

on this subject. It contains articles by 11 different authors on various aspects of the problems covered. It is an effort to present the material in sufficient detail yet in simple terms so that it will be understandable by anyone interested in safeguarding the health and welfare of working people. It begins with a survey of industrial hygiene, in retrospect and in prospect, presents records and reports, and includes chapters on specific problems involved in industrial hygiene.

Mathematics at Work

HOLBROOK L. HORTON. The Industrial Press, 148 Lafayette St., New York 13. 728 pages. Drawings, diagrams, charts, tables, formulas, index. $6.

Subtitled "Practical applications of arithmetic, algebra, geometry, trigonometry, and logarithms to the step-by-step solutions of mechanical problems, with formulas commonly used in engineering practice, standard reference tables, and a concise review of basic mathematical principles." It is intended as a working manual for machine designers, tool engineers, gage designers, mechanical draftsmen, technical or trade school students, and teachers.

BOOKLETS

TELLING YOUR COMPANY STORY TO THE PLANT AND COMMUNITY. L. J. Fletcher, Director, Training & Community Relations, Caterpillar Tractor Co. Research Div., California Personnel Management Assoc., 870 Market St., San Francisco 2, 12 pages. $1.

LABOR BOARD'S NEW RULES. James J. Reynolds, Member, National Labor Relations Board. Research Div., California Personnel Management Assoc., 870 Market St., San Francisco 2. 9 pages. $1.

THE RIGHT TO WORK. Cecil B. DeMille's testimony before the House of Representatives' Committee on Education & Labor. Research Division, California Personnel Management Association, 870 Market St., San Francisco 2. 12 pages. $1.

APPLICATION OF ARC WELDING TO LOCOMOTIVES. F. H. Harrison, Chief Mechanical Engineer, South Australian Railways, Adelaide, South Australia. Reprinted from "Design for Welding." The James F. Lincoln Arc Welding Foundation, Cleveland 1. 32 pages. Photographs, diagrams, tables. No charge.

PLANNED MAINTENANCE, FOR BETTER RESULTS AT CONTROLLED COST. Wallace Clark & Co., 521 Fifth Ave., New York 17. 4 pages. No charge.

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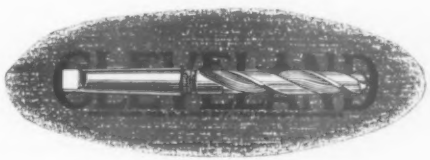
Yes, there are many advantages in selecting the right drill for each job. For instance, one of our customers was getting excessive breakage with regular jobbers' length drills on the set-up pictured here—drilling holes 7/16 inch deep in stainless steel. A *Cleveland* Service Representative was able to correct this situation by recommending a stub screw machine drill which, because of its heavier construction and shorter length, is giving complete satisfaction. *Your* drilling problems, too, perhaps can be solved by a *Cleveland* Service Representative—without cost or obligation. Contact our nearest Stockroom, or . . .

Telephone Your Industrial Supply Distributor



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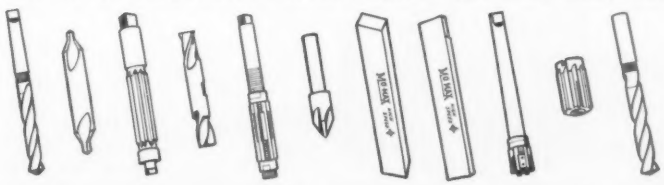

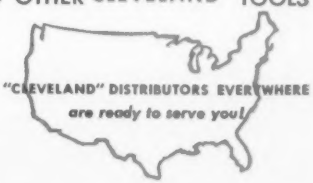

HOW AMERICAN INDUSTRY WAS HELPED TO INCREASED PROFITS LAST YEAR

Many large industrial plants were helped to increase profits last year by the Bausch & Lomb Industrial Vision Service. This service positively demonstrated its value by reducing accidents, increasing production per worker, improving quality, decreasing training costs, lowering labor turnover and boosting employee morale.

The B&L Vision Program is the result of more than eight years of scientific research in industry. Research showed the direct relationship between employee job performance and specific visual skills . . . showed that every job has definite visual requirements which can be scientifically determined. Against these standards are compared the visual skills of present and prospective employees. Those failing to meet the standards may be helped by professional eye care, or may be transferred to departments or jobs where their vision is no longer a handicap and often an asset.

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CITY ..... STATE .....

ON THE CALENDAR

FEBRUARY

3-4, Electrical Maintenance Engineers, 10th Annual Electrical Equipment Exposition; Public Service Building Lodge Room, Milwaukee. E. C. Siller, Chairman, 4655 No. 39th St., Milwaukee.

4-6, Refrigeration Equipment Manufacturers' Association, First Southern Refrigeration and Air Conditioning Educational Conference and Exhibit; City Auditorium, Birmingham, Alabama. H. F. Hildreth, President, 1346 Connecticut Ave., N. W., Washington 6.

14-16, American Management Association, Personnel Workshop; Palmer House, Chicago. J. Dooher, Manager, 330 West 42nd St., New York 18.

21-22, Materials Handling Conference; Purdue University Department of Engineering and Technical Extension Division in cooperation with Midwest Materials Handling Society, Materials Handling Institute, and Indiana Materials Handling Society; Purdue University. Merle M. McClure, Technical Extension Division, Purdue University, Lafayette, Ind.

28-Mar. 4, American Society for Testing Materials, Spring Meeting; Edgewater Beach Hotel, Chicago. Robert J. Painter, Assistant Secretary, 1916 Race St., Philadelphia 3.

MARCH

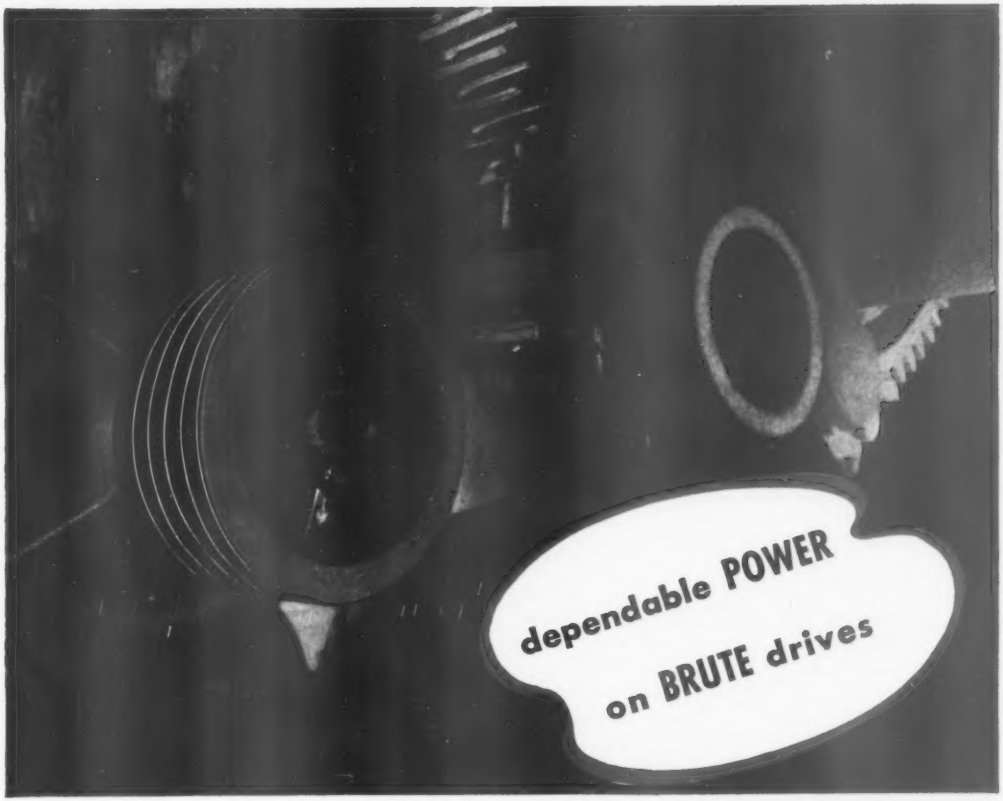
3-5, American Society of Training Directors, 5th Annual Meeting; Hotel Carter, Cleveland. F. S. Laffer, General Chairman, Graphite Bronze Co., 17000 St. Clair Ave., Cleveland.

8-10, The Society of Automotive Engineers, Production Clinics; Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

10-12, American Society of Tool Engineers, 17th Annual Meeting; Hotel William Penn, Pittsburgh. Harry E. Conrad, Executive Secretary, 10700 Puritan Ave., Detroit 21.

13-18, National Electrical Manufacturers' Association, Spring Meeting; Edgewater Beach Hotel, Chicago. R. J. Blais, Convention Manager, 155 East 44th St., New York.

17-18, American Management Association, Conference on Market-



Condor Whipcord V-BELTS have 8 Advantages

This drive in the preparation plant of a large Indiana coal company is typical of the service for which Condor Whipcord V-Belts are engineered. Five heavy-duty Condor V-Belts are installed on this 75 HP motor, operating a big kiln-type stoker-fired dryer.

Here are 8 acknowledged advantages of Condor Whipcord V-Belts that insure dependable power on heavy industrial applications:

1. **Wide margin of strength**
2. **Minimum inelastic stretch**
3. **Uniform flexibility**
4. **Maximum resistance to structural breakdown**
5. **Smooth running**
6. **Maximum traction**
7. **High resistance to side wear**
8. **Correct lateral reinforcement**

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RAY-MAN brawny V-Belts are Manhattan's latest development for rugged or exceptionally troublesome drives. Special-Engineered Strength Members absorb shock better. Protected against moisture, shrinkage and oxidation, RAY-MAN V-Belts are also Oil-Proof, Non-Spark and Heat-Resistant.

Look into these Manhattan constructions and save on the extra service they give you. "Keep Ahead with Manhattan"

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62 Types Available
THE PROPER FLUX for the Job
KESTER Soldering FLUX
Using the proper flux for the job will greatly increase soldering efficiency. Contact Kester's Technical Department on any flux problem. There is no obligation.
Salts and paste available in 1, 5, 10, and 50 pound containers.
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CONNECTING LINKS
A vastly improved connecting link that combines safety with unique simplicity in assembly. Its strength exceeds the published strength of comparable alloy chain . . . assembles rapidly without the use of special equipment.
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Combination sling of wire rope and chain connected by Wedglock safety links.
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ing; Hotel Statler, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

24-25, Industrial Relations Center, 7th Annual Institute; University of Minnesota, Minneapolis. Herbert G. Heneman, Jr., Chairman, Industrial Relations Center, University of Minnesota, Minneapolis.

27-April 1, American Chemical Society, Spring Meeting; Fairmont Hotel, San Francisco. Alden H. Emery, Secretary, 1155 Sixteenth St., N. W., Washington, D. C.

29-April 1, International Lighting Exposition, 3rd International Exposition and Conference; Stevens Hotel, Chicago. B. F. Stevens, 326 West Madison St., Chicago 6.

29-April 1, Safety Engineers, Annual Convention; Hotel Statler, New York, Paul F. Stricker, Executive Vice-President, Greater N. Y. Safety Council, 60 East 42nd St., New York 17.

APRIL

2-8, American Association of Industrial Physicians and Surgeons, Annual Meeting and Industrial Health Conference; in conjunction with American Conference of Governmental Industrial Hygienists, American Industrial Hygiene Association, American Association of Industrial Dentists, and American Association of Industrial Nurses; Book-Cadillac and Statler Hotels, Detroit. Dr. Edward C. Holmblad, Managing Director, 28 East Jackson Blvd., Chicago 4.

11-13, American Society of Lubrication Engineers, Annual Convention and Lubrication Show; Hotel Statler, New York. W. F. Leonard, Secretary-Treasurer, 343 South Dearborn St., Chicago 4.

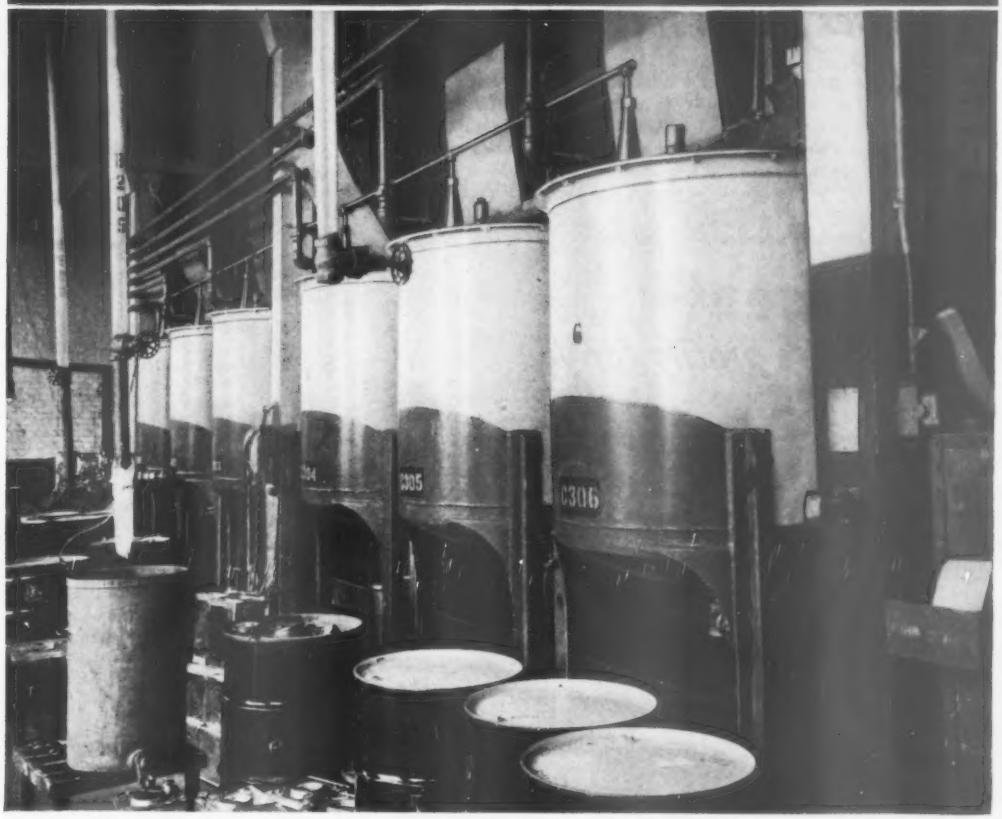
11-14, National Association of Corrosion Engineers, Annual Conference and Exhibition; Netherland-Plaza Hotel, Cincinnati. A. B. Campbell, Executive Secretary, 905 Southern Standard Bldg., Houston 2.

11-15, American Society for Metals, 6th Western Metal Congress and Exposition; Shrine Auditorium, Los Angeles. W. H. Eisenman, Managing Director, 7301 Euclid Ave., Cleveland 3.

12-13, American Management Association, Production Conference; Waldorf-Astoria, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

18-20, Midwest Power Conference, Annual Meeting; Sherman Hotel,

THIS USED TO BE A FIRE HAZARD



—BUT IT'S NOT ANY MORE

Years ago, a fire *did* start in one of the vats used in making protective coatings at a large lacquer plant. The blaze was quickly extinguished, without damage, by a 50-pound carbon dioxide (CO_2) wheeled unit.

But that fire convinced the plant management that things would be safer with built-in *automatic* fire protection. So they installed a *Kidde** system and gave it a 24-hour job to do. It's *always* ready to swoop down on fires in the 6 agitating vats shown, as well as in 7 mixing and 8 finished-product vats.

Because this *Kidde* system must guard three separate batteries of vats, automatic directional valves turn the CO_2 into the zone where fire's been spotted. And, as the CO_2 rushes along its path to the fire, it sets off pressure trips and switches that slam closed the open hatches on the vats, and shut down all machinery.

It's *all* automatic. An automatic *Kidde* extinguishing system never gets panicky, never does the wrong thing. Also, CO_2 won't dilute or contaminate materials in the vats.

That's just one instance, of course, of the thousands of tricky fire hazards protected by *Kidde* skill and equipment. *Whatever* your fire-protection problem, a Kidde representative can help you.

When you think of CO_2, call Kidde!

*Also known as "Lux"

The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

Walter Kidde & Company, Inc. • 232 Main Street, Belleville 9, New Jersey

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raises profits for Lucas Paints

Here is the truck—the only truck built to stack from narrow aisles. The Crescent AISLE SAVER increases storage space while it lowers handling costs at the John Lucas Company, Gibbsboro, N. J. Slipping in and out of confined areas, the AISLE SAVER tiers loads to ceiling height. It eases and speeds loading and unloading of carriers. One operator, instead of a crew, does the entire job of lifting, hauling and stacking.

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A Crescent

can raise profits for you

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Chicago. Ronald A. Budenholzer, Director, Technology Center, Chicago 16.

19-20, California Personnel Management Association, 21st Pacific Coast Management Conference; Claremont Hotel, Berkeley, Calif. A. B. Tichenor, President. 442 Flood Bldg., San Francisco 2.

21-22, The Society for the Advancement of Management, Inc., Time Study and Methods Conference; Hotel Statler, New York. Carl S. Coler, Executive Director, 84 William St., New York 7.

25-27, Triple Mill Supply Convention: American Supply and Machinery Manufacturers' Association, Inc., National Supply and Machinery Distributors' Association, and Southern Supply and Machinery Distributors' Association; Cleveland Auditorium, Cleveland. James J. DeMario, Chairman, Raybestos-Manhattan, Inc., Passaic, N. J.

28-30, National Council of Industrial Management, Annual Meeting; Niagara Hotel, Niagara Falls, N. Y. William F. Meyer, Executive Secretary, 347 Madison Ave., New York.

MAY

2-3, Association of Iron & Steel Engineers, Annual Spring Conference; Lord Baltimore Hotel, Baltimore. T. J. Ess, Managing Director, 1010 Empire Bldg., Pittsburgh 22.

2-4, American Society of Mechanical Engineers, Spring Meeting; Hotel Mohician, New London, Conn. Ernest Hartford, Executive Assistant Secretary, 29 West 39th St., New York 18.

2-5, Chamber of Commerce of the United States, Annual Meeting; Chamber Building, Washington. T. Kelley Back, Assistant Secretary and Controller, 1615 H St., N. W., Washington 6.

2-13, British Industries Fair, 1949 Third Postwar Exhibition: engineering industries, Castle Bromwich, Birmingham; lighter industries, Earl's Court and Olympia, London. British Information Services, 30 Rockefeller Plaza, New York 20.

5-6, American Society for Quality Control, Annual Meeting; Copley Plaza Hotel, Boston. Warren R. Purcell, General Chairman, Lamp Div., Sylvania Electric Products, Inc., Loring Ave., Salem, Mass.

9-13, American Management Association, Conference on Packaging; Auditorium, Atlantic City, N. J. James O. Rice, Secretary, 330 West 42nd St., New York 18.

It has gone a long way in improving conveyor belt strength

Du Pont "Cordura" High Tenacity Rayon

For high strength at low cost...look into Cordura*

There's a long lift involved for conveyor belts that carry coal and ore from mine pits to loading stations. To give these belts the terrific tensile strength required, engineers have turned to Du Pont "Cordura" High Tenacity Rayon.

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"Cordura" is engineered to yield much greater strength than natural fiber yarns commonly used. And each strand is a continuous filament—no short pieces to pull apart under strain.

Perhaps you'd expect to pay a premium for the advantages of "Cordura." But in many cases you can reduce production costs because you get so much strength from so little!

Can you use "Cordura" to improve an article you *make?* Write Du Pont for detailed information about "Cordura" High Tenacity Rayon. And tell us your specific needs. Perhaps we can help guide you to a profitable application.

Can you *use* a product improved with "Cordura"? Check with your supplier—or write Du Pont.

Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware. *REG. U. S. PAT. OFF.

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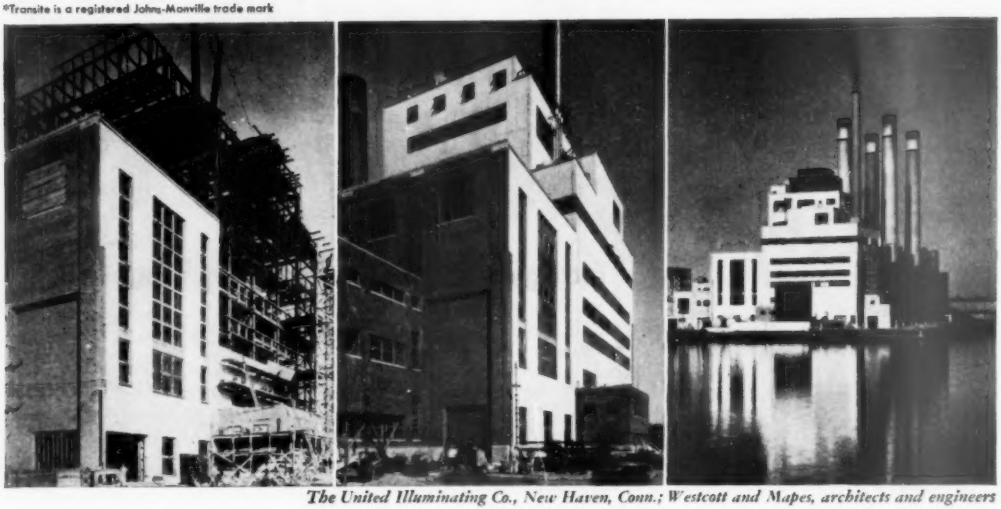
...THROUGH CHEMISTRY

for RAYON... for NYLON... for fibers to come... look to DU PONT

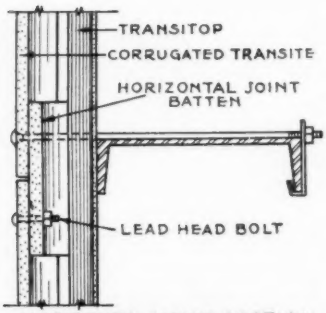
CORRUGATED TRANSITE* ... *for Curtain Walls*

*Transite is a registered Johns-Manville trade mark



The United Illuminating Co., New Haven, Conn.; Westcott and Mapes, architects and engineers

Asbestos Corrugated Transite reduces load-bearing factor 83% on new power plant addition! Transite sheets give attractive, streamlined appearance ... and they can't rot, rust, or burn.



HORIZONTAL JOINT SECTION

● Here's a case in which a unique form of asbestos wall construction solved a tough building problem.

The addition planned was to be almost twice the height of the original building, yet where the two joined, existing foundations were to be used. This meant that the new bearing wall with all its extra height should weigh no more than the old wall.

After careful study, it was decided to use the Johns-Manville Industrial Curtain Wall, a system of dry wall construction which combines J-M Corrugated Asbestos Transite with J-M Transitop (Insulating Board faced with Flexboard).

This type of construction, compared with solid masonry, reduced the load-bearing factor from 120 to 20 pounds per square foot! It also provided fire protection, insulation, and permitted the use of less extensive pilings and foundations for the rest of the building.

Architects and engineers are constantly discovering new uses for J-M Corrugated Asbestos Transite, not the least of which is its surprisingly effective function in attractive, modern design.

Send for new brochure which may help you on your next project. Johns-Manville, Box 290, New York 16, N. Y.

EASY TO BOLT TO STEEL

EASY TO SAW

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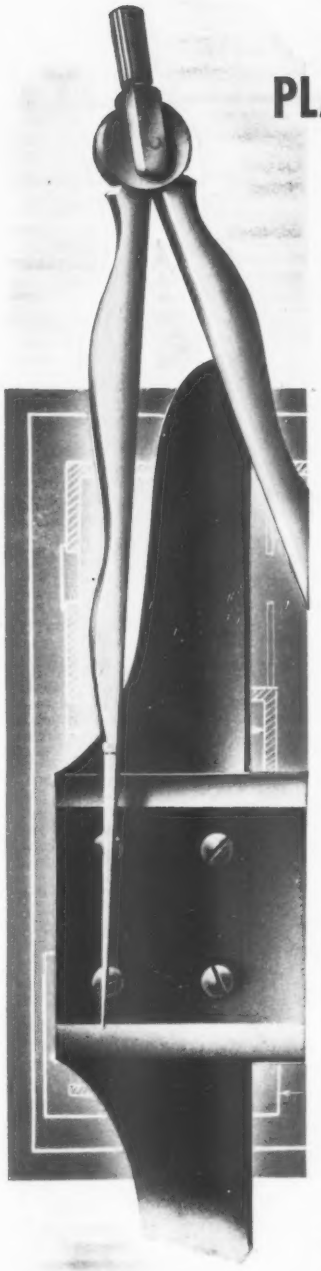
Johns-Manville *Asbestos* **CORRUGATED TRANSITE**

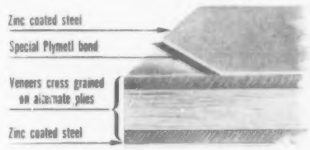


PLAN WITH *Plymetl*

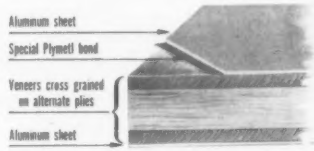
MAKES BETTER PRODUCTS POSSIBLE

Plymetl combines the light weight and rigidity of plywood with the strength of metal. Through 25 years of performance, Plymetl has proved its versatility, durability and dependability. When the War created shortages in supplies of critical metals Plymetl received still greater attention and wider use. Here Plymetl's performance in military equipment proved its worth as a basic structural material. For many applications Plymetl is unsurpassed. Where your product design requires a flat smooth surfaced material of unusual strength and light weight, a material unaffected by moisture and mold and fungi — and rust resistant — SPECIFY PLYMETL. A few of the more widely used types of Plymetl are described and diagramed below.

✻ PLYMETL VE and EVE — A plywood plaque with zinc-coated steel sheet permanently bonded by an exclusive Haskelite method to one (VE) or both faces (EVE). Plymetl panels may be obtained in a range of thicknesses and sizes to suit specific applications. Simple wood-or-metal working tools will fabricate Plymetl.

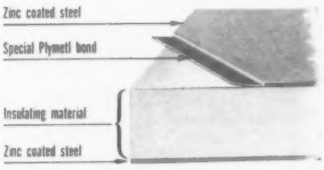


✻ PLYMETL VU and UVU — A plywood plaque with aluminum sheet permanently bonded to one (VU) or both faces (UVU). The great strength and light weight factors of plywood are combined with the light weight of aluminum. Plymetl may be formed to certain curvatures.



✻ PLYMETL ESE — A panel of insulating material with metal sheet permanently bonded to both faces (ESE).

Other types of core materials may be used to make varied kinds of Plymetl. To these cores, metal faces of monel metal, porcelain enamel steel, and stainless steel can be bonded. A core material may be faced with one type of metal on one side and another type on the other side. On all Plymetl panels, the metal faces provide an ideal surface for finishing.



Write for complete data on Plymetl, and bulletin SC45 which gives details on other types of Haskelite materials. Let Plymetl and Haskelite engineers help you design and build products that look better . . . sell better . . . and perform better.

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BELT, COATED ABRASIVE—called Backstand Belt, for grinding, polishing, finishing. 4-page booklet, construction, advantages, method of using with contact wheel and backstand idler, case histories. Armour & Co., Coated Abrasives Div.

8
BELT CONVEYOR BOOSTER — light-medium duty, stationary. Bulletin PB-64-70-2A. Photographs, specifications, capacities listed. Island Equipment Corp.

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BOILERS — "Meet the Titusville Boiler Family," 4-page booklet. Photographs of different types, diagrammatic drawings of water tube boilers from 70 to 1500 hp. The Titusville Iron Works Division, Struthers Wells Corp.

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BRUSHES—for power-driven brushing tools, for paint and varnish, and for maintenance. 36-page Condensed Pocket Catalog 195. Photographs, descriptions, dimensions, other specifications. The Osborn Mfg. Co.

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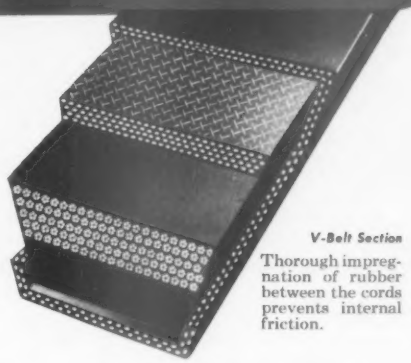

V-Belt Section

Thorough impregnation of rubber between the cords prevents internal friction.

Thermoid Impregnation Process* Assures Longer V-Belt Life

Thermoid V-Belts are built for the job!

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Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

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* **Thermoid**

Impregnation Process

The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasion action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

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CONTROL, ELECTRONIC REMOTE—for electric hoists with motor-driven trolleys, for electric cranes, similar applications. Construction, operating principles, where suitable. Omnicon Corp.

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CONVEYOR, GRAVITY — Photographs of construction, applications; different types, sizes; uses and features; specification tables; new accessories. 8-page Form RWC-48. The Rapids-Standard Co., Inc.

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CONVEYORS—light-duty roller bed belt type, for handling parts, boxes, cartons. Bulletin P-A5-1A-2, 4 pages. Diagrams, photographs, specifications. Island Equipment Corp.

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CONVEYORS, TROLLEY—"Make Ceilings Pay Dividends," 28-page booklet. Photographs of different types of installations, specially-made hangers, bus bars. Link-Belt Co.

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COOLERS, DRINKING WATER—**22(a)** 3-gal. bottle type, model BC-3 and BC-3B. Description, photograph, features. **22(b)** 10-gal. self-contained Models PB-10, 10B, 10W. Photographs, features, parts; specifications, ratings, bubbler capacity table. Temprite Products Corp.

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CUTTING TOOLS—Shear, wire, and angle cutting tools, called Hand-

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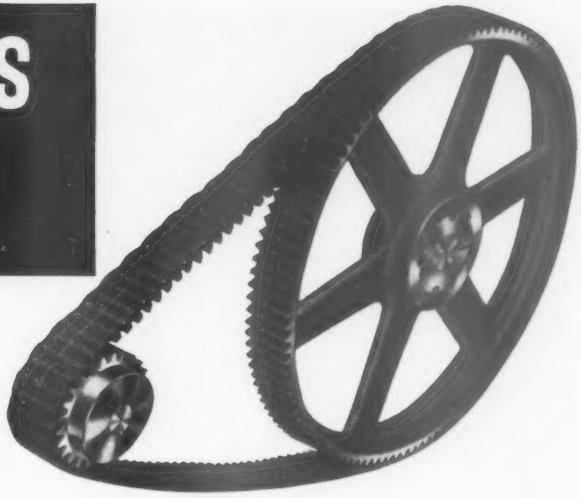

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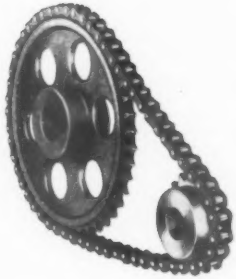

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Morflex Couplings

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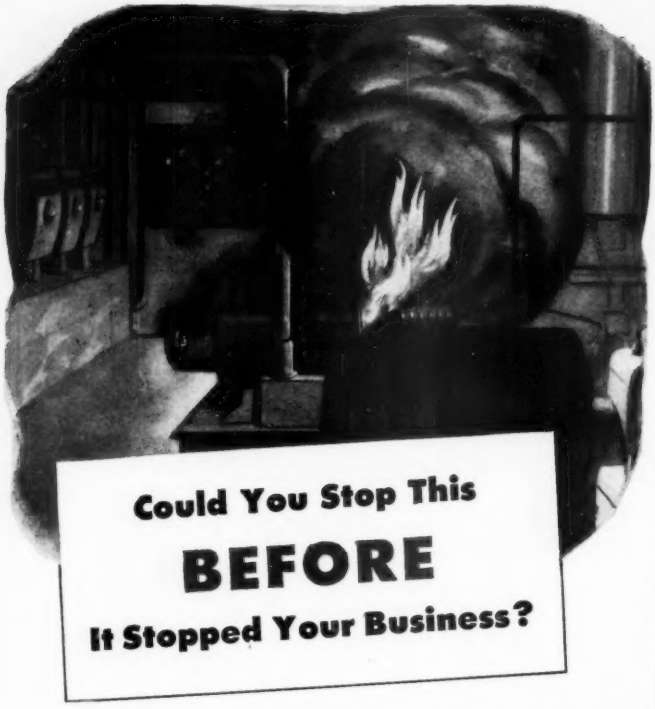

● You try to foresee everything that might interfere with production, then bang!—You get hit hard by something that was always there, threatening, but you were too busy to figure the gamble. Stop a moment and ask yourself: What would one bad fire *tomorrow* do to the company? What is the key spot, which, if knocked out, would lose most time to put back in operation?

Cardox CO_2 means amazingly quick extinguishment, eliminating or reducing fire damage *with no extinguishment damage.* From single locations to complete plant systems, Cardox assures all the CO_2 needed to put out the fire. Skillfully engineered equipment applies it efficiently in pounds or tons.

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Cardox Atmosphere Inerting Systems provide low-cost inert gas for continuous fire and explosion protection.

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Klip, described, pictured in 6-page folder. Characteristics, features, capacities, applications of each. H. K. Porter, Inc.

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26

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DILUTERS—cone-type, for automatic gas-air systems. Technical data for selection of safety equipment, suitable mixtures for various purposes. Operating principles, construction. Bulletin L-500, 12 pages. Eclipse Fuel Engineering Co.

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FASTENERS—for paper, rubber, plastics, wood, fabrics, light metals. "Time- and Money-Saving Case Histories," 16 pages. Sketches show different kinds, uses, of stapling and wire stitching machines. Bostitch.

33

FEED CONTROLLER — called Power-Check, for pneumatic or manual drill presses, similar equipment. Features, capacities, installation and maintenance data; photographs, diagrams, parts list. National Pneumatic Co.

34

FILES—Line of over 150 different shapes, cuts, sizes of milled curved-tooth files for metals, alloys, hard non-metallic substances. 8-pages. American Swiss File & Tool Co.

35

FLOOD LAMP, PORTABLE—called Light King, with extendible trouble light and lead, mounted on reels. Form 1148100; photographs, construction data, features, specifications. The Keller Laboratories.

36

FLOOR MACHINE—called Floormaster, with automatic sealed-in-oil lubrication, for polishing, waxing,

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scrubbing, drycleaning, all types of floors. Description, features, photographs. Atlas Machinery Corp.

37

FOOT GUARD — Metatarsal arch guard, called Safeet, described, pictured. Trinal Inc.

38

GAS BURNER UNITS—called Pow-R-Semblies. Packaged complete with pressure blowers. Capacities, specifications, dimensions, alternative assemblies, for blowers, air heaters, dryers, kilns, ovens, other equipment to which open burners with controlled flames are suitable. 6-page Data Sheet 7C-1A. Bryant Heater Co., Industrial Div.

39

GRINDING MACHINE SWIVEL TABLE CONTROL—for electronic alignment, adjustment, setting, called Electralign. Operating principles, applications, setting instructions; comparator selector, grinding machines also described. Brown & Sharpe Mfg. Co.

40

GRINDING WHEELS—for centerless grinding. Explanation of centerless grinding, uses, 4 basic methods; wheel selection, job-material-specification recommendation chart; sizes of wheels. 8-page Form ESA55. Simonds Abrasive Co.

41

HEATERS, INDUCTION—and control instruments, for preheating before welding and stress relieving after welding. Photographs and features of different models, specifications, applications. Electric Arc, Inc.

42

HEATERS, RADIANT—42(a) Glassless infra-red baking, drying, heating. 4-page Booklet CS-603. Uses construction, applications, characteristics. Sketches, diagrams. **42(b)** Application Reports Nos. 101, 102, 103, 104, and 105, on heating metal molds, drying plastic powders, static removal from paper on printing press, maintaining processing temperature, and flowing of sealing material in battery case, respectively. Photographs, description of process, installation, operation of each. Edwin L. Wiegand Co.

43

HUMIDIFIERS, STEAM — for controlling relative humidity to protect hygroscopic material in storage or in process. 12-page Bulletin 1771. Tables, charts of suitable relative humidity in various industries; installation, operation, selection, prices of 8 different models. Armstrong Machine Works.

44

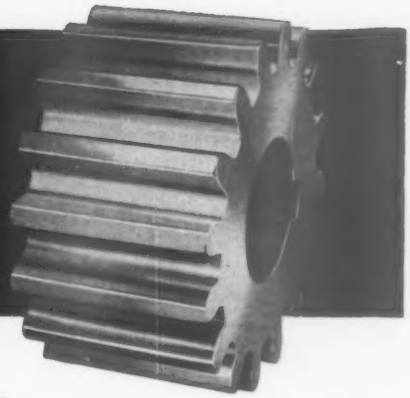
HYDRAULIC ELEVATING TABLES — for transporting and leveling strips and sheets. 6-page Bulletin 261; installation photographs, specifications, capicities. Lyon-Raymond Corp.

45

INFRA-RED HEATING UNITS—portable, called Porta-Flexer. Flat, hinged, face-to-face types. Photographs, diagrams. The Miskella Infra-Red Co. **46**

INSULATING OIL RECLAMATION UNIT—called Portable Hydro-Volifier, for cleaning, stabilizing, dehydrating, degasifying transformer and circuit breaker oils. 40-page Bulletin, Figure 621. Photographs, diagram, specifications, sequence of oper-

Ampco Bronze Gears



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You can count on Ampco Bronze to stand up under the most brutal punishment. This extra stamina is all-important *in any gear* — from a thimble-size drive for a fishing reel to the rolling-mill gear (illustrated below).

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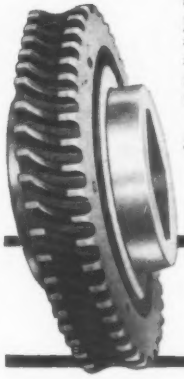
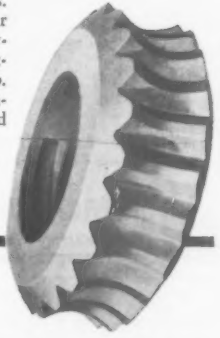
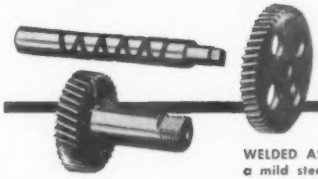


SAND-CAST AMPCO METAL — Massive 2416-lb. worm gear which plays a critical part in the "screw-down" mechanism of a giant-size rolling mill.



CENTRIFUGAL CASTING (including teeth) — Used as a boom hoist gear on large excavating shovel. Withstands wear, fatigue, shock, and abrasion caused by dust, dirt, and loading.



EXTRUDED AMPCO METAL — Tiny drive-gears and level-wind gears for a fishing reel; designed to give perfect performance and service under widely varied conditions.

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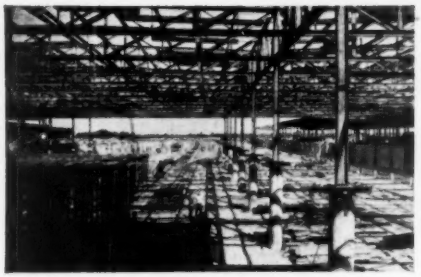

The Austin Company used the Smooth Ceilings System to combine two types of construction in the new Upjohn plant at Kalamazoo, Michigan.

Special steel grillages which are employed in this system, were embedded in the tops of the reinforced concrete basement columns. Structural steel columns which support the roof were then erected on these grillages. After the steel framing for the roof and the roof deck were in place the huge 400,000 sq. ft. slab over the basement was poured.

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afions, case histories, dimensions, weights. Bowser, Inc.

47

INSULATING OIL RECLAMATION UNIT—called the Houdaille Puri-Vac, for purifying, dehydrating, degasifying insulating oil either in the field or at a central station. Construction, operating principle; applications. Honan-Crane Corp., Subsidiary of Houdaille-Hersey Corp.

48

INSULATION TESTERS — called Megohmer. 6 different models; description, photographs, features of each. Herman H. Sticht Co., Inc.

49

LADDER STAGE—for use on extension ladders. Photographs show different uses, construction details. Specifications, price. Juniata Co.

50

LAMP ANNUNCIATORS — "Basic Data Sheet"; photographs, standard types of cabinets; basic types of annunciators; data chart of lenses, lampholder units, lamp bulbs. The H. R. Kirkland Co.

51

LATHES—13- and 14½-in. swing 1-in. collet capacity, 1⅜-in. spindle bore. 4-page Catalog 73; photographs of different models, specifications; attachments, accessories. South Bend Lathe Works.

52

LIGHTING EQUIPMENT, FLUORESCENT—Single lamp units, Line-o-lamp fixtures, reflectors, fittings, parts; wired and assembled units. Capacities, dimensions, photographs, diagrams. The Wiremold Co.

53

LUBRICATION EQUIPMENT—for transferring, oil and greases, for loading grease guns, for applying oils and greases. Hose assemblies and parts, airline hose and accessories, fittings, connecting parts, header blocks, accessories. Photographs, different models, barrel-to-bearing selection guide. Stewart-Warner Corp., Alemite Div.

54

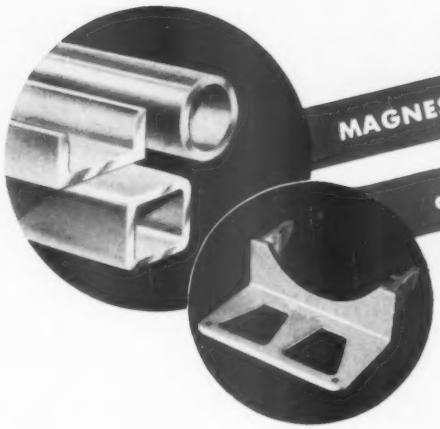
MACHINE TOOL EQUIPMENT—including motors, drives, controls, coolant pumps, induction heating units. Engineering service offered. 8-page Bulletin 25B7110. Allis-Chalmers Mfg. Co.

55

MAGNETIC DRUM SEPARATORS—non-electric, for removing tramp iron, medium fine ferrous contamination from spouts, chutes, or other conveying systems not employing belts. Applications, operating principle, description, features; photographs. Eriez Mfg. Co.

56

MAGNETIC EQUIPMENT — **56(a)** Road sweeping magnets, high intensity, for removing nails, spikes, tramp metal. Photographs, sizes, capacities. Bulletin B-1302A. **56(b)** Floor Sweeper, for hand use. Photographs, features, applications, specifications. Bulletin B-1307A. **56(c)** High intensity magnetic detector, for use on conveyor belts or in chutes. Mounting instructions, how it works, features. Bulletin B-1901A. **56(d)** Magnetic concave rolls, for high-speed handling of steel and iron pipe, rod, sections, and angles. Description, photographs. Bulletin B-1003A. **56(e)** Rectangular triple-pole high intensity magnets. Catalog 301-A, applications, installa-



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HEADQUARTERS FOR SCALES

tions. **56(f)** Perma-Plate Alnico magnets. Bulletin B-1205A; features, uses; different types. Dings Magnetic Separator Co.

57

MAGNETIC GAGES—for continuous gaging on rolling mills, shearing lines, receiving inspection and final inspection lines; photographs. Pratt & Whitney, Division Niles-Bement-Pond Co.

58

MAGNETS, SEPARATION — rectangular and round. Construction and applications of each, selection chart, dimensions, weights, capacities; suspension data; typical installations. The Ohio Electric Mfg. Co.

59

MATERIALS HANDLING EQUIPMENT—Motorized cranes, monorails, jibs, controls, switches, turntables, runways, hoists, accessories. 12-page booklet. Photographs of installations. Abell-Howe Co.

60

METAL BAR STOCK—for centrifugal castings, and heat treated variations. 8½x11-in. laminated stock list card. Weights, diameters on one side; chemical and physical properties with photomicrographs of each grade on other. Drawings, diagrams. Ampco Metal, Inc., Dept. WH.

61

METAL SHELVING, BINS—61(a) 5-shelf unit No. 10. Different models, specifications, construction data. Also parts bins, heavy-duty steel work bench. 4-page Catalog Series 25. **61(b)** Steel parts bins; photographs of different kinds, dimensions, features. Fort Steuben Metal Products Co.

62

MOTORS, FAN COOLED—totally enclosed, with tube-type air-to-air heat exchangers. 4-page Bulletin 05B7150. Photographs of vertical squirrel cage, synchronous, and wound rotor models. Description, features, applications. Allis-Chalmers Mfg. Co.

63

MOTORS, LARGE ELECTRIC—called Design "X." Squirrel-cage induction, for direct connection to air compressors operating at 720, 600, and 514 r.p.m. Characteristics, different models, ratings. Electrical Machinery Mfg. Co.

64

NOZZLES, BLASTING—with tungsten carbide liners and accessories. Applications in sand-blasting, foundry and heat treating, maintenance. Table of costs, nozzle selection chart. Mills Alloys, Inc.

65

PAINT CIRCULATING SYSTEMS—for identical finishes at different spray stations throughout the plant. 4-page Bulletin 550. Photographs, diagram, installations. Binks Mfg. Co.

66

PALLET STACKING DEVICE—called Paltier. Explanation of method, description of device, advantages. Photographs, features. Engineering service. The Paltier Corp.

67

PLANT DISTRIBUTION SYSTEMS—11 basic types, descriptions, operating principles of each. Photographs of installations; characteristics. 34-page No. 48-000, B-4045. Westinghouse Electric Corp.

68

PNEUMATIC TOOLS—including ro-

New G-E Wiring System Offers Unlimited Possibilities In Modern Lighting Control

Multiple Switching from Many Locations Available at Low Installation Cost With G-E Remote Control

Switch your garage lights ON or OFF from any room in your home—in hospitals, give every patient a light switch next to his bed—in industrial plants and commercial buildings, let every night watchman have a centralized bank of switches for all lights in his area. These are just a few of the many possibilities that can be brought about by the new remote control system, recently announced by the General Electric Company.

Easy to Install

Using existing methods for wiring all power circuits, the General Electric remote control system requires no new materials or techniques except in the switching circuit itself. In this circuit a small, low-voltage relay does the actual switching. Control of this relay can be placed practically anywhere in a building, simply by installing lightweight wires from the relay to conveniently located wall switches, specially developed for this purpose. "Easy as wiring a doorbell," is the way one observer described this circuit.

Because this new system cuts the cost of materials used in multi-switch applications, because it makes possible a large number of controls on any individual circuit, General Electric remote control clears the way for wide use of multi-switch control in structures of all types.

Keeps Costs Down

In residential wiring, this new system means real "dream-home" electrical control even in residences where costs must be cut to the bone. Simple applications include the example of garage lights given above—also attic fan and cellar light controls in various parts of the house. In the completely modern house, all lights and outlets can be controlled from various locations.

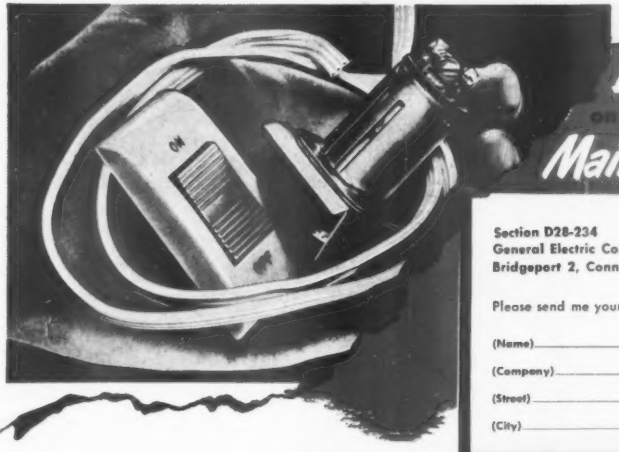
In dormitories, institutions, and commercial buildings, General Electric remote control can provide an effective centralized system for lighting control. Wherever "lights-out" regulations are in effect, a master panel of remote control switches can be used to enforce these regulations for an entire building or a whole floor. In commercial structures or plants, a similar system can be used to turn out lights left on after hours. Commercial and industrial operations can profit by the over-all multi-switch control offered by this system.

Offers New Ideas

To everyone concerned with building and remodeling, this new system offers a completely new range of ideas on flexibility in the use of electricity. To the architect, it means a new era in electrical convenience in structures of all sizes and types. To the buyer and the investor, it means increased workability and extra value, now and in the years to come. To the electrical contractor, General Electric remote control offers a vast, new field for his services.

To answer questions on the applications of General Electric remote control—to explain the procedure and the materials required—the General Electric Company has prepared an informative booklet on the subject. This booklet is a valuable guide for everyone interested in this new system. To get your copy early, simply fill out the coupon and mail it today.

Here are the essential components of the new General Electric remote control system: the switch, the small transformer (not shown), the relay, and the lightweight No. 18 wire. All accessories necessary for the system are manufactured by General Electric and sold through your General Electric Construction Materials distributor.



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tary, vertical piston types; grinders and sanders; chippers, riveters, rammers; compression riveters; air hoists; accessories. 48-page Catalog 14. Photographs, descriptions, specifications. Keller Tool Co.

69

POWER UNITS, HYDRAULIC ELECTRIC—with Gyrol fluid drive. Type TM, 1 through 20 hp. 4-page Bulletin 8519. Photographs, ratings, dimensions. American Blower Corp.

70

PRESSURE AND FLOW CHART—for air and hydraulic equipment. Push and pull stroke pressures for various cylinder sizes with various piston rod diameters, oil consumption data, pipe size table, friction pressure loss table. Available in 3-color 22x34-in. wall chart or 8½x11-in. black-and-white perforated ring binder sheet. Miller Motor Co.

71

PROTECTIVE COATING for boilers, heating coils, steam accumulators, sterilizing retorts, molds, other wet-heat processing equipment. Called Apexior No. 1. Application data, principles, procedure in use; equipment; brush holder and brush selector chart. Also similar product, No. 3 for cold-wet service; Thur-malox, for hot-dry service. The Dampney Co. of America.

72

PUMPS, CENTRIFUGAL — single-stage, enclosed impeller, ball-bearing, belt and motor driven models. 8-page Sheet A-2, 622; photographs, sectional view, parts list; materials used; specifications; performance chart; dimensions, diagrams. Goulds Pumps, Inc.

73

RESISTANCE TESTERS — "Megger" heavy-duty type insulation resistance testers; hand-driven, motor-driven, multi-voltage models; applications. 24-page Bulletin 21-20-17. James G. Biddle Co.

74

RETAINING RING—called Pirolox. Features, characteristics, dimensions, specifications. Photographs of assembly procedure. 8-page Catalog 201. Spirolox Div., Ramsey Corp.

75

RING PACKING—called Palmetto G-T. Description, applications, test data, design and operating features, dimensions for rod, piston types. Greene, Tweed & Co.

76

SAFETY HELMET—called Hard Boiled Hat, described in 4-page circular. Protective characteristics, moisture and electric shock resistance. E. D. Bullard Co.

77

SIGNAL SYSTEM—plug-in flashing light, called Visibel. Applications, features, specifications; photograph, connection diagram. Ewart & Koch.

78

SILICONE FLUIDS—32-page Note Book No. 3, Form C-13-948, on DC 200 fluids. Chemical structure, applications, general properties. Charts, photographs. Dow Corning Corp.

79

SKIN PROTECTOR, CLEANER—called Practic-Kreme. **79(a)** Where and how to use, skin hazards against which it is effective. Also description of waterproof skin protector, Prack Formula 33; ink-stain remover, Magic Prack Ink-Off; and hand perspiration preventive called Drihan. **79(b)** Dispenser, loaned to

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● What is your humidity conditioning problem? If the requirements are in the range up to 50% relative humidity at 80°F you will want a Kathabar System to accurately control it for you. Some installations operate as low as many degrees below zero without frosting.

Kathabar Systems are engineered and installed to live-up to design conditions. Kathabar Engineers know the importance of controlled humidity to processing and comfort atmospheres and are committed to follow-through to give results.

That's why customers continue to buy Kathabar Systems as new needs arise. There are as many as 20 units in one particular plant. These were repeat orders over a period of 6 years. There are other such examples, too!

Kathabar Systems have been proved in industry. If you have a humidity condition that you want to control, specify Kathabar.

GET THE FACTS ● Ask a Kathabar Humidity Engineer to tell you about Humidity Conditioning. Let him present proof of Kathabar System reliability and dependability. Get the facts first-hand!

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☐ Send booklets on Industrial and Comfort Humidity Conditioning

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users of Practi-Kreme, described. Chemical Specialties, Inc.

80

SNOW LOADER—Model 522. 8-page booklet; operating principles, features, controls. Photographs of parts, construction. Barber-Greene Co.

81

SPEED REDUCER, WORM GEAR—fan cooled, called Speedaire. 8-page booklet presents case histories, typical installations, photographs. The Cleveland Worm & Gear Co.

82

SPRAYER—portable, with built-in compressor, for all sprayable liquids. Called the Payswell. Photographs, applications, price. Sellco Corp.

83

STEAM CONSERVATION—"Here's How to Save Heating Steam," by William B. Pride, of Boeing Airplane Co. 12-page reprint, File 400-20. Builders-Providence, Inc.

84

STEAM GENERATORS — 10-page Bulletin B-3250A. Features, construction data, performance ratings, specification tables, installation photographs, boiler setting diagram. The Titusville Iron Works Division, Struthers Wells Corp.

85

STEEL BARS—union drawn, for carburizing. Carbon, alloy steels; different shapes, sizes; characteristics, analysis; photographs; applications. Republic Steel Corp.

86

STEEL BINS, SHELVING—other storage equipment. Photographs, dimensions, different models. 4-page Folder 2-48. Superior Mfg. Co.

87

STEEL REEL ROLLER—for dispensing cable, other material wound on reel. Photographs show device in use, construction. Bulletin RR-2. The M. B. Austin Co.

88

STORAGE RACKS—barrel, drum, skid types, and accessories. 16-page Bulletin 4873; photographs of different installations, details of construction. Barrett-Cravens Co.

89

SWITCHGEAR, CONTROL DEVICES—Rotary control switches, pushbutton stations, generator voltage regulators, synchro-operators, current and potential transformers, oil and air circuit breakers, oil immersed contactors, other equipment. Types, rating; wiring diagrams; typical station combinations. Bulletin 25B-7095, 16 pages. Allis-Chalmers Mfg. Co.

90

TAPE, SELF-ADHESIVE—for coding, labeling, routing, instructions. 2-page release describes uses, characteristics. Transparent Products Co., Inc.

91

TRACTOR—Model 65. Construction details, list of tools and attachments, different uses, general specifications. Osco Motors Corp.

92

TRUCK, RAM—called Power Giant. 12-page Bulletin 2412; engineering specifications, capacities, weights, battery sizes, speeds, dimensions, electrical and mechanical features. Photographs and exploded views show construction. Yale & Towne Mfg. Co.

93

TRUCKS, FLOOR—Freighter, Warehouser, and Handy Andy models.

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The WHITING Electric Hoist is *13 Times as Fast* as a Hand Hoist.....

You can speed up your materials handling and cut idle time with Whiting electric hoists. These powerful little hoists will handle heavy loads 13 times as fast as a hand hoist. By releasing men and machines for productive work, these hoists will pay for themselves in a very few months.

The unique worm-gear drive of the Whiting hoist means simpler construction, fewer parts, and greater compactness. The hoist is steel from hook to hook—the load is entirely supported by shock-resisting steel, for the utmost in strength and safety. A single-bar grip provides easy one-hand control, freeing the other hand for steadying the load.

Another feature of the Whiting hoist is its dual-voltage motor. By a simple change in internal connections, the motor can be quickly converted from 220 to 440 volts or vice versa. A ½-ton Whiting hoist is also available with a single-phase motor, for operation on 110-volt, 60-cycle current.

To install a Whiting hoist, simply hang it up, plug it into the nearest electrical outlet, and it's ready to go. The hoist is so light in weight that one man can install it alone, yet it has the ruggedness to stand up under heavy duty.

Yet the One-Ton Size Costs Only

$230.00 F. O. B. HARVEY, ILLINOIS

If It Saves One Man Only 12 Minutes a Day IT PAYS A PROFIT!

Write for Bulletin H-100A

WHITING CORPORATION
15689 Lathrop Avenue, Harvey, Illinois

WHITING

ELECTRIC HOISTS

½-¼, 1, and 2-Ton Sizes

Improve Surface Finishes
Increase Tool and Die Life

with PANGBORN HYDRO-FINISH

What is Pangborn Hydro-Finish? It's the new, versatile impact blasting process that uses a fine mesh abrasive suspended in water, yet holds tolerances of the work to .0001 inches.

What Hydro-Finish can do for you Pangborn Hydro-Finish can help you three ways, by improving surface finishes, by removing oxide scale, by lengthening tool and die life through proper maintenance. Here's how . . .

In the Production Line . . . It eliminates many tedious finishing operations. It reduces cost and time involved in buffing. It improves fatigue life of the metal parts it finishes. It cuts many varied manufacturing costs.

In the Tool Room . . . New Hydro-Finish simplifies the manufacture and maintenance of tools, dies and molds. It reduces usual costly handwork and produces a surface virtually free from directional grinding lines.

Write today for details about the new Pangborn Hydro-Finish Cabinet. PANGBORN CORPORATION, 1282 Pangborn Blvd., Hagerstown, Md.

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BLAST CLEANS CHEAPER
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features, photographs, construction details. Specification tables of platform sizes, model numbers, types of wheels and casters, carrying capacities, weights. 4-page Bulletin TR-848. The Rapids-Standard Co., Inc.

94

UNIT HEATERS—horizontal, low-ceiling, vertical, and textile types. Estimated heat requirements, tables; ratings, design, mechanical features; construction; photographs, application views. Tables for determining mounting heights, steam pipe size; piping, motor, and control wiring diagrams. Graphic and topical indexes. Catalog 348. Ilg Electric Ventilating Co.

95

VALVE, AUTOMATIC LOW-PRESSURE SHUT OFF—called the Warden. Spring- and gravity-actuated models; operating features, photographs, diagrams. Applications. Security Valve Co.

96

VALVES — flanged, gate, needle types; flanges; hose nipples; bars; welding electrodes; screw machine products. Physical and chemical properties, analysis, corrosion resistance. Specifications, dimensions, features of each type. Worthington Pump & Machinery Corp.

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VALVES—3-way and straightway; solenoid air-pilot operated and direct solenoid operated. Applications, descriptions, diagrams, typical installations. Ross Operating Valve Co.

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VISE, AIR-POWERED — foot-controlled; 3 standard models. What it is, how it works, different applications. Photographs show uses, parts; instructions for installation; accessories. Van Products Co.

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WELDING EQUIPMENT—including electrode holders, ground clamps, cable connectors, cable splicers, terminal connectors, cable lugs, carbon electrode holders. 12-page Twecolog No. 7; photographs; specifications, parts, prices. Tweco Products Co.

103

WHEEL SPROCKETS — 80-page Catalog 48; roller block and silent chain; chains on sprockets, reducers, punch press drives. Photographs, specifications, technical data. Cullman Wheel Co.

104

WOOD PRESERVATIVE—"Protecting Your Investment in Wood," 4-page Bulletin A483, describes substance called Penta Preservative, its applications, how to use. Chapman Chemical Co.

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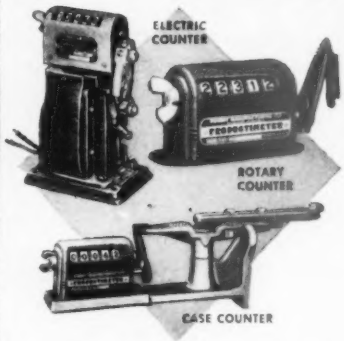

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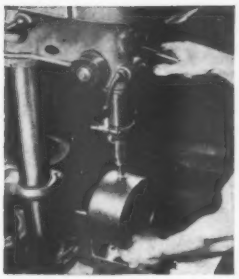
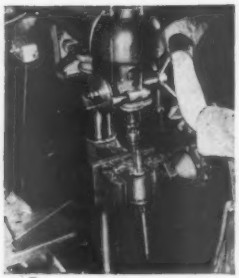
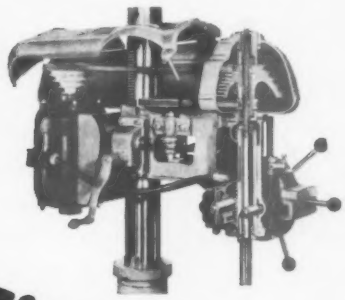




Model D-1101X. Price:
less motor and column $245.25



FOR EXAMPLE

KINGSTON-CONLEY ELECTRIC CO.

TRIPLES PRODUCTION BY TURNING MOTOR SHAFTS

WITH WALKER-TURNER 20" POWER FEED DRILL HEADS

Demands for increased production on turning motor and grinder shafts at Kingston-Conley Electric Co., North Plainfield, N. J., necessitated replanning production equipment and methods.

Replacing five lathes with five Walker-Turner 20" Power Feed Drill Presses each equipped with a molybdenum high speed box tool containing three separate bits held with set screws and a Jacobs Chuck on each spindle, *three shaft diameters are now turned in a single operation.* Power feed controls on Drill Heads feed the work into box tools at .003" to .009" per spindle revolution. Accuracy is kept at .004" tolerance.

Results: **production tripled; man-hour costs halved.**

Taking further advantage of the broad adaptability of Walker-Turner Machine Tools, Kingston-Conley has set up 15" and 20" Drill Heads with similar ingenuity in other departments of the plant. Increases in production and job efficiency have been equally outstanding.

Variable speeds and methods of mounting and control, plus the ability to work metals, plastics or wood, are the marks of all low-cost Walker-Turner Machine Tools. *For complete catalog, write to Walker-Turner Division, Kearney & Trecker Corporation, Plainfield, New Jersey.*

Photo, right: Turning motor shafts on standard 20" Power Feed Drill Presses.
Photo, upper left: Spinning insulation fibre bushings over steel motor bands with 15" Drill Press.
Photo, center above: Balancing motor rotors with 15" Drill Press. Depth Gauge Indicator shows amount of metal to be removed for correct dynamic balance.
Photo, upper right: 20" Power Feed Drill Head, Model D-1101X. 4 ball bearings, 6" spindle travel. Five standard spindle speeds, 400 to 2600 r.p.m. with 1740 r.p.m. motor. Capacity 1" in cast iron, ¾" in steel. Slo-speed motor optional.

walker-turner **MACHINE TOOLS**

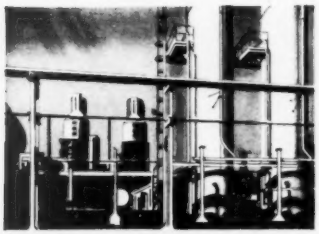
DRILL PRESSES—HAND AND POWER FEED
RADIAL DRILLS • RADIAL SAWS
BAND SAWS—FOR WOOD OR METAL
RADIAL METAL CUT-OFF MACHINES • MOTORS

SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS

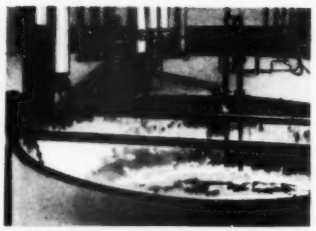
3465

Are Your Corrosion Problems As Severe As These?

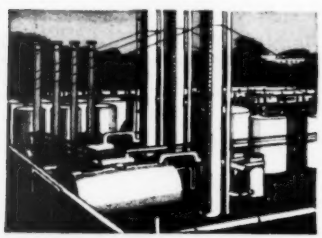
You won't be discouraged by any corrosion problem, when you read how these four companies have finally controlled extremely severe corrosion in their plants with a system of UCILON Protective Coatings!



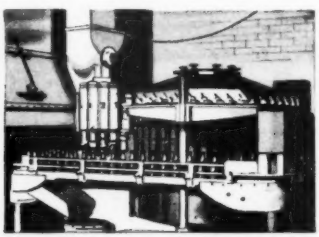
1. A WELL KNOWN REFINERY had Ucilon coatings applied to ducts exhausting oil and gasoline fumes at the cracking tower. One year after application, there was still not a sign of failure, despite the severity of the service.



2. A SOAP PLANT had a tough ceiling maintenance problem—some ordinary paints being destroyed by fatty acid vapors in as little as 2 weeks. Yet after *6 months* of exposure, Ucilon coatings were still totally unaffected!



3. A CHEMICAL PROCESSOR coated a steel storage tank with a Ucilon coating system. Especially hard on protective coatings, the tank's contents broke down two other coatings tried—one in 6 weeks. Yet Ucilon is still in good condition after *14 months!*



4. IN THE BOTTLING ROOM of one company, painting of machines was considered to be almost useless—until they discovered Ucilon. Nothing ever tried even approaches the effectiveness of Ucilon, which for *2 years* has been withstanding the humidity and spillage!

UCILON* 400

Ucilon 400 is a flexible, glossy, air-drying coating for metal, concrete and wood. It is applied by brushing or spraying. When solvents evaporate, a tough "plastic" film is formed. Ucilon 400 provides exceptional resistance to acids, alkalies, alcohols, oils and greases, salts, water, cleaning compounds, oxidizing agents.

OTHER UCILON COATINGS

Ucilon 1601—a ready-mixed, extra-bright aluminum paint with exceptional outdoor resistance. It stays bright under prolonged exposure, withstands elevated temperatures.

•

Ucilon 1501—a very hard, chip-resistant baking coating which resists chemical attack at temperatures higher than recommended for Ucilon 400.

SEND FOR THIS BULLETIN *which gives more details on various Ucilon coatings and their properties.*

Similar reports continue to arrive from plants of every nature. Maintenance men are discovering a degree of corrosion protection and service life they never achieved with any coating tried before. If *you* have an exceptionally tough coating problem, we're confident that there's a Ucilon coating system to help you stop corrosion damage and vastly lengthen the period between your paint jobs. Let us send you our specific recommendations without obligation. Write today, outlining the details of your application.

*Trade Mark Reg. U. S. Pat. Off.

UCILON Protective Coatings

UNICHROME products of UNITED CHROMIUM, INCORPORATED

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BROWNHOIST'S 1949 DIESEL ELECTRIC LOCOMOTIVE-CRANE MARCHES IN THE PARADE OF BROWNHOIST *FIRSTS!*

PIONEERS IN DEVELOPMENT OF DIESEL POWERED CRANE IN 1928
FIRST ELECTRIC LOCOMOTIVE-CRANE 1901
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MORE THAN FIVE HUNDRED DIESEL POWERED CRANES IN SERVICE
THE WORLD'S LARGEST CAPACITY DIESEL POWERED RAILROAD CRANE
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NEW BROWNHOIST DIESEL ELECTRIC LOCOMOTIVE-CRANE

Continuing their firsts, Brownhoist alone offers a complete line of Diesel Electric Locomotive-Cranes. Standard models available for every capacity requirement include the D.E.-30, D.E.-50, D.E.-60; special larger capacity sizes built to order. Write for complete information and literature.

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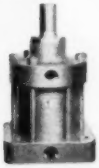
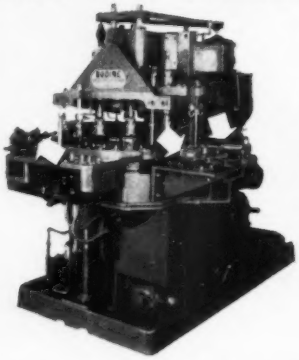
HERE'S HOW

T-J SAVES LABOR

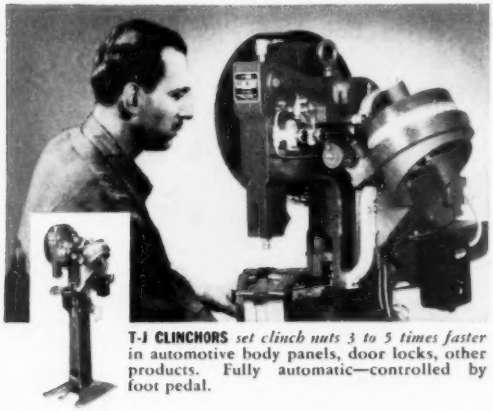
ON THOUSANDS OF JOBS FOR INDUSTRY!

T-J HYDRAULIC CYLINDERS *simplify machines* . . . save time and labor on jobs where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Shown here — a shell loading press with T-J Cylinders.





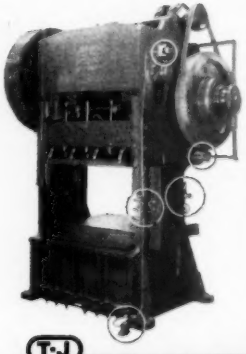
T-J AIR CYLINDERS *do push-pull-lift jobs* . . . 100 lb. to 12,000 lb. . . . wide range of styles, sizes and strokes. Shown here — Automatic Drilling and Threading Machine with T-J Cylinders.

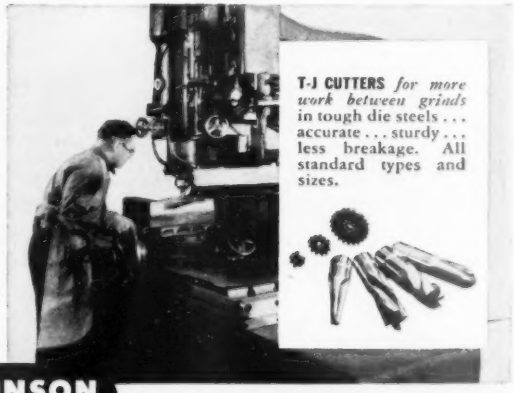


T-J CLINCHORS *set clinch nuts 3 to 5 times faster* in automotive body panels, door locks, other products. Fully automatic—controlled by foot pedal.

T-J RIVITORS *with automatic feeding and setting . . . air powered* for aluminum alloy rivets 1/16" to 1/4" dia., up to 3/4" long. *Electrically powered* for solid steel rivets 1/16" to 1/4" dia., up to 7/8" long.

T-J AIR CONTROLS *provide accurate, automatic control* for presses, brakes, other machines and equipment . . . designed for air cylinders in semi-automatic or automatic cycles.





T-J CUTTERS *for more work between grinds* in tough die steels . . . accurate . . . sturdy . . . less breakage. All standard types and sizes.

Send for catalogs.
The Tomkins-Johnson Co.
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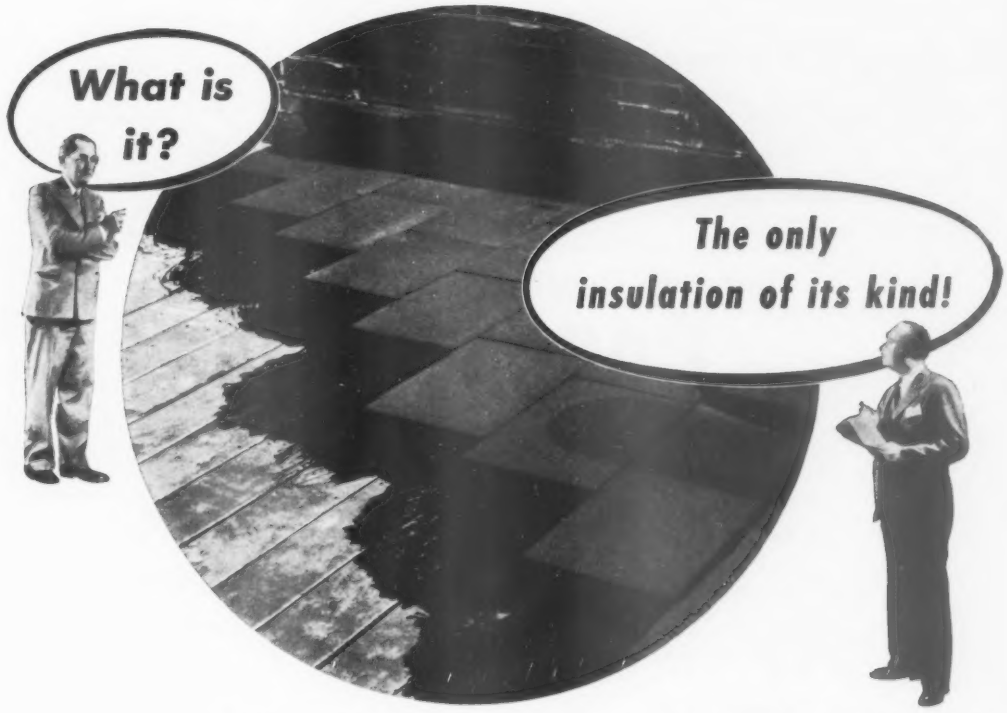
RIVITORS . . AIR AND HYDRAULIC CYLINDERS . . CUTTERS . . CLINCHORS

32 YEARS EXPERIENCE



● You have never seen any material like PC Foamglas. It looks solid, but is composed of millions of tiny sealed cells of *glass*. It is feather-light, yet will not crush when you stand on it.

Since it consists of cellular glass in the form of big, rigid blocks, PC Foamglas has outstanding insulating properties. And since glass is impervious to practically all elements that attack insulating materials, PC Foamglas retains its original insulating efficiency.

Executives who figure insulation on a cost-per-year basis, can tell you that PC Foamglas is the most economical insulating material. Once it is properly installed, you need not fear costly repairs, maintenance or replacement. With PC Foamglas, your first cost is your last cost.

When you are figuring on insulation for roofs and ceilings, for walls and floors, be sure you have complete information on PC Foamglas. Meanwhile, why not look over our most recent booklets on insulation? Just mail the convenient coupon and we shall be glad to send you *free* copies.

This is FOAMGLAS

The entire strong, rigid block is composed of millions of sealed glass bubbles. They form a continuous structure, so no air, water, vapor or fumes can get into or through the Foamglas block. In those closed glass cells, which contain inert air, lies the secret of the material's permanent insulating efficiency.

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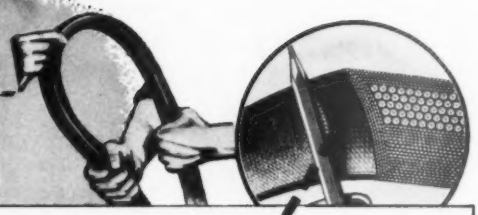
. . . when you insulate with FOAMGLAS . . . you insulate for good!

Grip the Sides of

ANY V-Belt...

FEEL the Sides CHANGE SHAPE

as the belt Bends—



-That SHOWS you Exactly WHY

THE CONCAVE SIDE

(U. S. PATENT NO. 1813698)

SAVES You MONEY

Bend any V-Belt and you can actually feel its sides change shape.

That's because the bending puts the top of the belt under *tension*, while the body undergoes *compression*. Naturally the sides of the belt *bulge out*—and if the belt is built with *straight sides*, you get the result shown in Figures 1 and 1-A, below:—

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove.

Clearly, the bending forces a straight-sided V-Belt into a shape that does not fit the sheave-groove—and the bulging produces excessive wear along the *middle* of the *sides*.

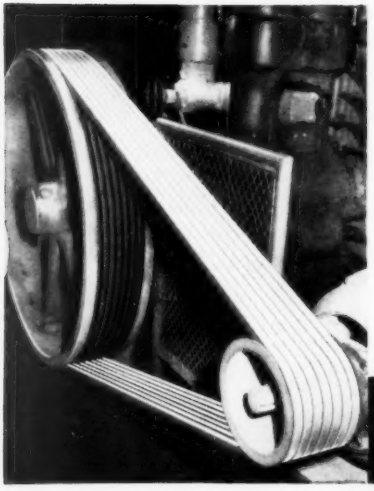
Now, bend the V-Belt built with the precisely engineered Concave Side (U. S. Patent No. 1813698)—the Gates Vulco Rope.

Gates Vulco Rope With Concave Side.

No Side Bulge. Precise Fit in Sheave-Groove.

You get the same shape change but *now* the new shape *exactly fits* the sheave-groove as shown in Figures 2 and 2-A.

Results—(1) *Uniform* side-wall wear; *longer* life. (2) *Full* sidewall grip on the pulley; carries heavier loads and sudden load increases without slippage — a big increase in drive efficiency — saving belt wear and also saving power!



The Concave Side is *MORE IMPORTANT NOW* Than Ever Before

Because the *sides* of a V-Belt are what actually *drive* the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley *directly* through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side naturally delivers greater savings today than ever before.

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

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492

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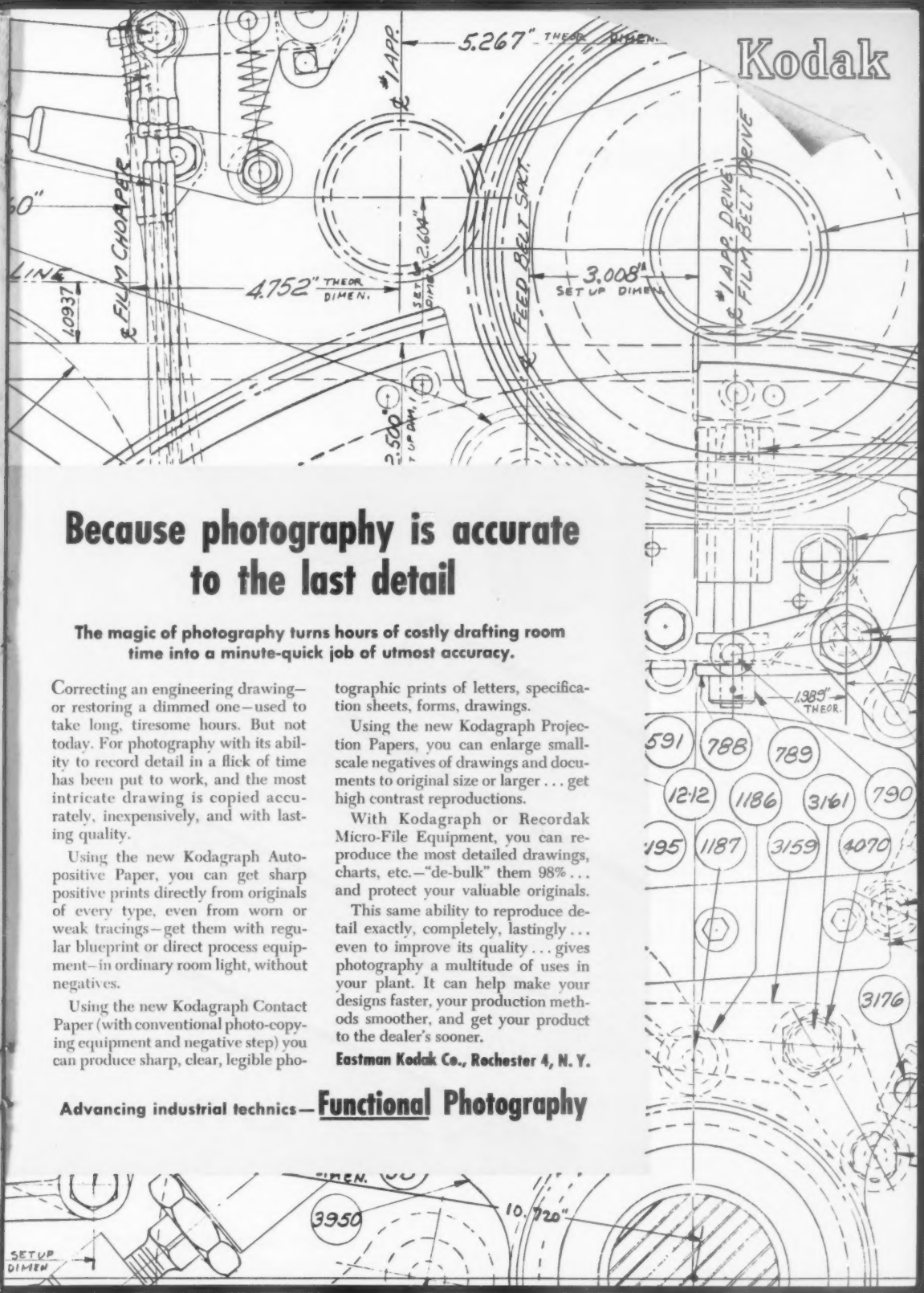
GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries



Because photography is accurate to the last detail

The magic of photography turns hours of costly drafting room time into a minute-quick job of utmost accuracy.

Correcting an engineering drawing—or restoring a dimmed one—used to take long, tiresome hours. But not today. For photography with its ability to record detail in a flick of time has been put to work, and the most intricate drawing is copied accurately, inexpensively, and with lasting quality.

Using the new Kodagraph Autopositive Paper, you can get sharp positive prints directly from originals of every type, even from worn or weak tracings—get them with regular blueprint or direct process equipment—in ordinary room light, without negatives.

Using the new Kodagraph Contact Paper (with conventional photo-copying equipment and negative step) you can produce sharp, clear, legible photographic prints of letters, specification sheets, forms, drawings.

Using the new Kodagraph Projection Papers, you can enlarge small-scale negatives of drawings and documents to original size or larger . . . get high contrast reproductions.

With Kodagraph or Recordak Micro-File Equipment, you can reproduce the most detailed drawings, charts, etc.—"de-bulk" them 98% . . . and protect your valuable originals.

This same ability to reproduce detail exactly, completely, lastingly . . . even to improve its quality . . . gives photography a multitude of uses in your plant. It can help make your designs faster, your production methods smoother, and get your product to the dealer's sooner.

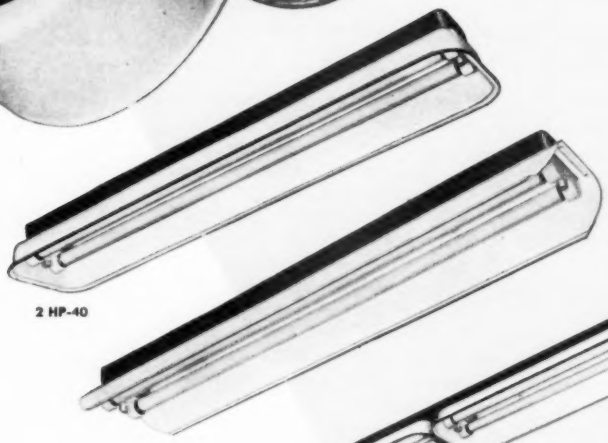
Eastman Kodak Co., Rochester 4, N. Y.

Advancing industrial technics—Functional Photography

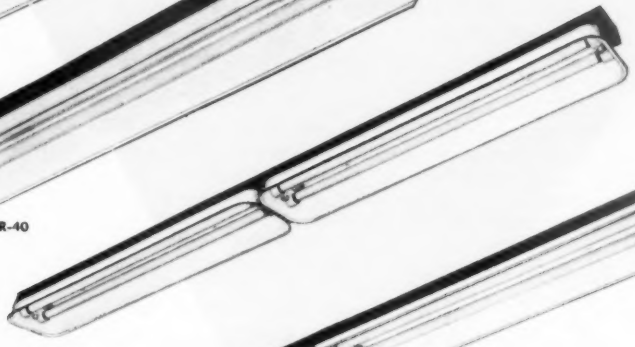
YOU CAN BE **SURE**.. IF IT'S

Westinghouse

2 HP-40



2 HPR-40



4 HPS-40

4 HPC-40

ANOTHER *Reason to Buy*

WESTINGHOUSE INDUSTRIAL FIXTURES

The Heavy Duty Lampholder

Announcing . . . the new push-type, twin lamp holder that radically cuts maintenance costs . . . eliminates socket replacements. Available now in the Westinghouse fixtures shown at left . . . *and at no increase in fixture price.*

The new heavy-duty holder is designed to help you sell more fixtures and increase your profits on maintenance jobs. It cuts socket replacement by eliminating breakage and chipping. Lamps can be inserted quicker—easier, and they can't fall out. Starters are housed in the lamp holder—can be changed without removing lamps. Smooth, rounded, one-piece construction makes cleaning simple.

CUTS MAINTENANCE COSTS 6 WAYS

1. The all-steel housing provides indestructible protection for the lamp holder.

2. Spring-type socket at both ends of fixture makes lamp insertion quick and simple. Lamp is guided into position by a bevelled ring guide. Once inserted, the lamp can't fall out!

3. Spring pressure at both ends of the lamp provides a "floating ride" for the lamps—minimizing the effects of shock and vibration.

4. Starters are readily accessible and can be replaced without removing lamps. Arrow on socket housing indicates lamp operated by starter.

5. Sliding action of spring contacts provides self-cleaning contact with lamp pins. A safe, positive electrical contact is assured.

6. Lamp holder wiring contacts are so arranged that connections can be made without removing unit from the fixture.

Specify Westinghouse fixtures with the new heavy-duty lamp holders. Save yourself and your customers needless maintenance expense.

For further information about the new Westinghouse line of industrial luminaires featuring the heavy-duty lamp holder, write for booklet B-4194. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-04202

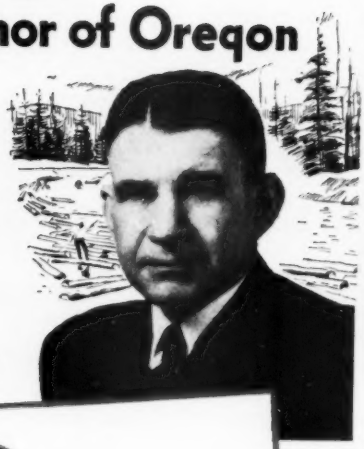
Westinghouse

PLANNED LIGHTING PAYS

UNION PACIFIC

The Governor of Oregon

Invites you . .



Douglas McKay

STATE OF OREGON
EXECUTIVE DEPARTMENT
SALEM

DOUGLAS McKAY
GOVERNOR

To American Industry:

Oregon's industrial payroll has doubled since 1940 and her population has increased 49 per cent. New abundant supplies of America's lowest cost electric power serve Oregon industries and can be increased--up to 1000 per cent more--through the continued development of the Columbia River and its tributaries.

New markets for Oregon made products are expanding year by year. Industrial opportunities here are most attractive to investors requiring safety factors in long period operations.

The rare continuity-of-work record in Oregon's industry and the sane administration of local and state governmental units are not accidental. Labor, business, government and agriculture in Oregon cooperate to assure favorable conditions for new payroll producing industries. Oregon's door is wide open to sound industry and good management.

And Oregon is a great place in which to live!

Very truly yours,

Douglas McKay

Governor

One of a series of advertisements based on industrial opportunities in the eleven states served by Union Pacific Railroad.

When selecting sites and seeking new markets in Oregon, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Utah, Washington, Wyoming . . .
address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Streamliners

Where

CUTTING FLUID

SELDOM does the most carefully developed scientific theory provide the final answer in the shop; neither is practical experience entirely dependable. It usually takes a combination of both in order to select and apply the cutting fluid that will give the best results on a given machining job.

D. A. Stuart Oil Company offers you a combination of theory and practical experience that pays dividends in better machining and fewer production headaches. The *theory* emanates from research in the modern D. A. Stuart laboratories; *practical* approach comes from men who have years of experience in shop problems and techniques. That is why Stuart products so often smooth out jobs on which other cutting fluids fail. Ask your D. A. Stuart Oil Co. representative to tackle your tough jobs.

ON-THE-JOB REPORTS PROVE RESULTS

". . . D. A. Stuart's SOLVOL Water Mixed Cutting Compound was put in on a trial basis for milling high carbon alloy steel. High speed alloy cutters were used and it was found that SOLVOL increased the cutter life 3 to 4 times over what they had been getting. . . ." Write, if you would like to have a booklet on SOLVOL.

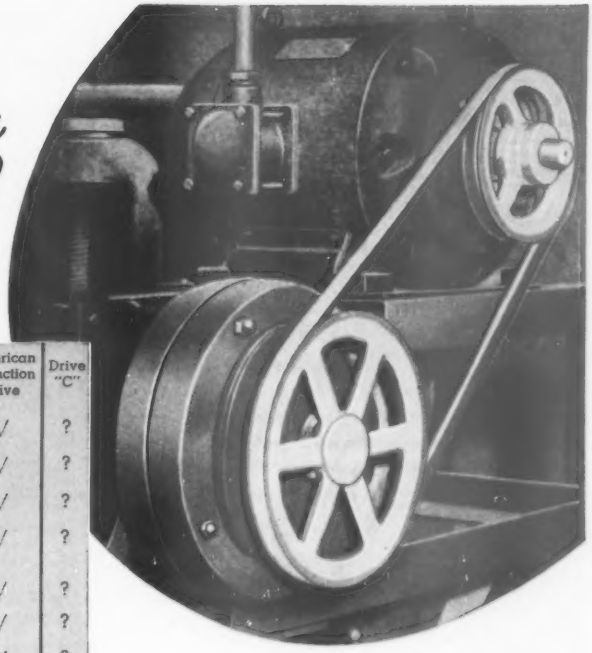
STUART oil engineering goes with every barrel

D.A. Stuart Oil CO.

2735 S. TROY ST. • CHICAGO 23, ILLINOIS

are you getting ALL 8 advantages from your slow-speed drives?

	Drive "A"	American Reduction Drive	Drive "C"
1. Starting Shocks Eliminated	?	√	?
2. Fast, Flexible Speed Changes	?	√	?
3. Simple Installation	?	√	?
4. Minimum Attention	?	√	?
5. No Special Supports or Foundations	?	√	?
6. Space-Saving Design	?	√	?
7. Weight-Saving Construction	?	√	?
8. Maximum Efficiency	?	√	?



ALL 8 ON THE JOB!

Here is the record on this *American* Reduction Drive operating the bowl of a Dorr #226-D Classifier: Original spur-gear drive failed several times each year resulting in heavy losses due to spoilage and machine shut-down. *American* Reduction Drive required no maintenance other than lubrication—eliminated break-down and spoilage—paid for itself three times in the first year!*

*Name on request.

for lower operating costs, higher output—

CHECK ALL 8 *First!*

Here is the *only* Reduction Drive that gives you every operating advantage you need to reduce costs and raise output. Check for yourself! *American* Reduction Drives give you fast, easy speed changes—you simply substitute sheaves of different diameters. You can get any driven speed below 154 r.p.m. with standard, stock parts. You save installation time because the Speed Reduction Unit mounts right on the shaft of the driven machine. No special engineering, foundations, or supports are needed. Compact design gives you extra floor space. Best of all, you increase equipment life because the primary belt drive cushions equipment-damaging shock loads. Semi-annual lubrication is all that is required.

For lower operating costs and higher output, check *all 8* first! Drop us a line for the *American* Reduction Drives Handbook—it gives you complete installation and specification information. Write today.

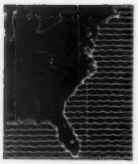
For Immediate Delivery From Stocks . . .
See Your *American* Drives Distributor.

The American Pulley Company

4208 WISSAHICKON AVE. • PHILADELPHIA 29, PA.

HAJOCA

"3 way" SERVICE



The Place . . .

HAJOCA CORPORATION

Hajoca Corporation, headquarters for over 33,000 industrial products, stands ready to serve your every requirement. Where service and quality of product is essential, it is the wise buyer who calls HAJOCA FIRST for industrial requirements . . . maintenance, repair and operating supplies.

The Time . . .

NOW

To save time, and make ONE CALL do the work of six or seven, call your nearest Hajoca Branch . . . NOW.

The Product . . .

1 OF 33,000

VOGT DROP FORGED STEEL VALVES are of non-porous close-grained structure, capable of resisting pressures up to 6600 pounds per square inch w.p. and temperatures up to 1000° F. A complete line of Vogt Valves is a typical example of the industrial supplies available through 31 Hajoca Branches on the Atlantic Seaboard.

Write for Hajoca's New 1949 Industrial Catalog . . . Use the coupon below. (Distributed only in Hajoca's Territory.)

I-20

Please send me at once, the 1949 Hajoca Industrial Catalog.

Company_____

Address_____

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Your Name_____

PLUMBING HEATING INDUSTRIAL SUPPLIES HAJOCA SINCE 1858

HAJOCA CORPORATION

31 Branches Serving the Atlantic Seaboard
General Offices: 31st and Walnut Street Bridge
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CASE REPORT No. 52 from a series of actual cases recording the successful application of "BEAR" DY-NAMIC BALANCING to Industry.

BLOWER WHEELS FOR OIL BURNERS BALANCED IN LESS THAN 2 MINUTES!

MT. HAWLEY MFG. CO., PEORIA, ILL., reports: With this "Bear" Dy-Namic Balancing Machine, Model 340-R, blower wheels ranging in size from 5" to 9" diameter, are balanced in an average time of 1 minute and 42 seconds. Result: Much quieter and smoother oil burner performance!

Dy-Namic Balance FASTER!

for Quieter, Longer Life Performance

You can obtain improved product performance and elimination of noise and vibration at LOWER COST through this *faster* "Bear" Dy-Namic Balancing Method. Lower initial capital investment and a low cost-per-unit are made possible by this revolutionary "Bear" Method. These Dy-Namic Balancing machines are being used throughout industry during the manufacturing process, as well as for maintenance operations. With "Bear", Dy-Namic Balancing is speeded up to a point where the operation hardly interrupts routine production . . . simplified to a point where men and women learn to Dy-Namically Balance rotating parts in just a few hours.

Some typical applications of "Bear" Dy-Namic Balancing

Air Conditioning Fans
Blower Wheels for oil burners
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Refrigeration units and equipment
Steam Generators
Sheaves
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SEE DY-NAMIC BALANCING MANUAL FOR MANY MORE APPLICATIONS!

FREE MANUAL tells you how!

Send now for this FREE, fact-packed 22-page Dy-Namic Balancing Manual for rotating parts weighing from 4 oz. to 8 tons! Write: Bear Mfg. Co., Dept. F-1, Rock Island, Illinois.

BEAR

STATIC AND *DY-NAMIC BALANCING* MACHINES

Trade Mark Reg. U. S. Pat. Off.

Test your Brush I.Q.

No. 2 in a Series

What determines the bristle's resilience?

The bristle's resilience or elasticity is due to its taper, for bristle is thicker at the root end than at the flag. This natural taper gives the bristles springiness, as demonstrated on a larger scale in a fisherman's fly rod.

This springiness, or elasticity, is necessary in a good painting tool. Pittsburgh combines various lengths and kinds of bristle to give the ideal elasticity for each length and type of brush.

PITTSBURGH—
Produces the Most Complete Brush Line in the Industry!

Painting . . . Purchasing agents from coast to coast depend on Pittsburgh's complete line of brushes for every use. It's a reliable source for Gold Stripe, Neoceta, and Nylon. And in these days of rising costs, you'll welcome the Pittsburgh Neoceta brush as a *real* economy in painting tools.

Maintenance . . . When it comes to sweeps, dusters and scrubs—there's none better than Pittsburgh's "Lightning Line".

Industrial . . . Pittsburgh maintains a crew of skilled engineers to quickly and effectively solve your power-driven brush problems. You'll find their assistance valuable in developing any type of power-driven brush to your particular specifications. Write or call Pittsburgh Plate Glass Company, Brush Division, Baltimore 29, Maryland.

***One Source—One Quality—One Name to Remember*—PITTSBURGH!**

BRUSHES FOR INDUSTRY

BRUSHES · PAINT · GLASS · CHEMICALS · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

DARNELL
CASTERS & WHEELS

Built for the Job

A SAVING AT EVERY TURN

Reduce floor and equipment wear to a minimum — increase employe efficiency with the casters that "always swivel and roll."

DARNELL CORP. LTD.
LONG BEACH 4, CALIFORNIA
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Dependable
FLOW CONTROL

...IN YOUR
TEMPRITE
DRINKING WATER COOLERS

1. Dependable, automatic flow-control does away with spouting and splashing. No annoying water fluctuations. **2.** Smart, streamlined styling blends harmoniously into all surroundings. **3.** Effortless finger-tip pressure produces a steady stream of perfect-temperature drinking water. **4.** Temprite bubbler design gives maximum sanitary protection.

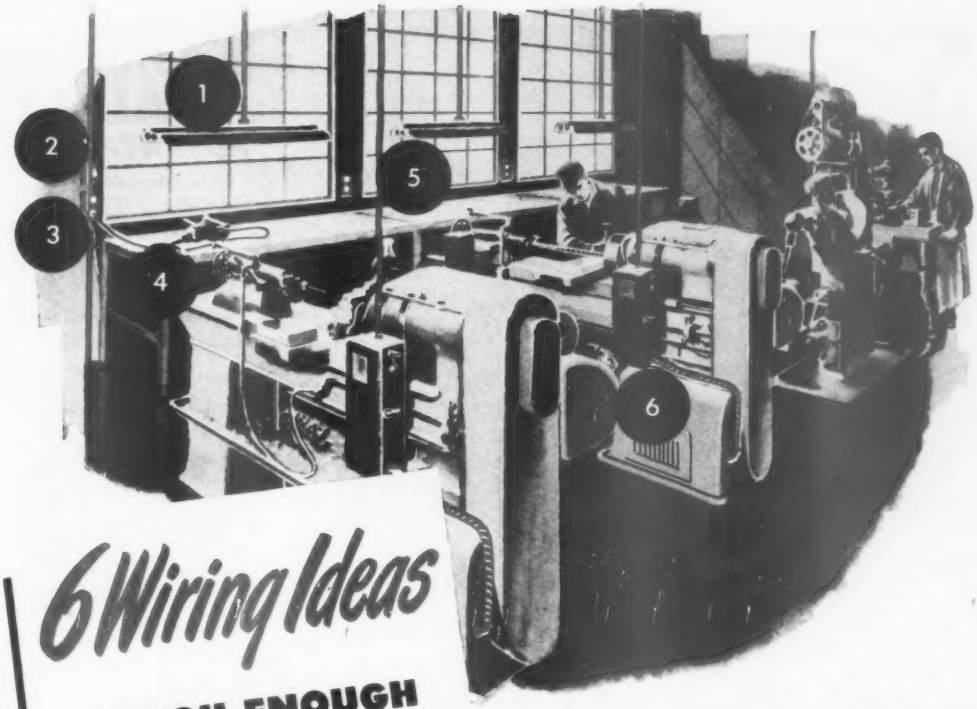
User Protected by 5-Year Warranty Plan

All models meet requirements of the National Bureau of Standards and Underwriters Laboratories, Inc.

Write for name of distributor in your neighborhood.

Manufacturers of water cooling equipment since 1929.

TEMPRITE PRODUCTS CORP.
35 PIQUETTE AVE. DETROIT 2, MICH.



6 Wiring Ideas

TOUGH ENOUGH FOR TOOLROOMS

Cutting costs is the toolroom's job. And all wiring material in a toolroom has got to be tough enough to work economies every step of the way.

That's why we've picked six cost-cutting General Electric wiring materials right off your distributor's shelves to help you get full value out of every dollar.

1. **HEAT-RESISTANT** Deltabeston* wires go a long way toward reducing maintenance. Made for locations like this, where ambient heat and high-level lighting circuits are a problem, Deltabeston wires are a "must" for every shop. Consider Deltabeston wires and cables for all circuits where heat is a threat, and wherever high current densities are involved.

2. **HEAVY-DUTY SWITCHES** selected from the complete General Electric line have the toughness it takes to stand up in a toolroom. They're totally enclosed to keep out flying chips and dust—built to take a beating day after day. Choose the switch for the job you want to do from General Electric's wide range of 20- and 30-ampere types.

*Trade-mark Reg. U. S. Pat. Off.

3. **HEAVY-DUTY OUTLETS** have got to be tough, too, to take the abuse of a toolroom. Three-wire outlets from the General Electric line are available in types to meet the most difficult specifications. Sturdy construction and tough materials are used throughout in these heavy-duty units.

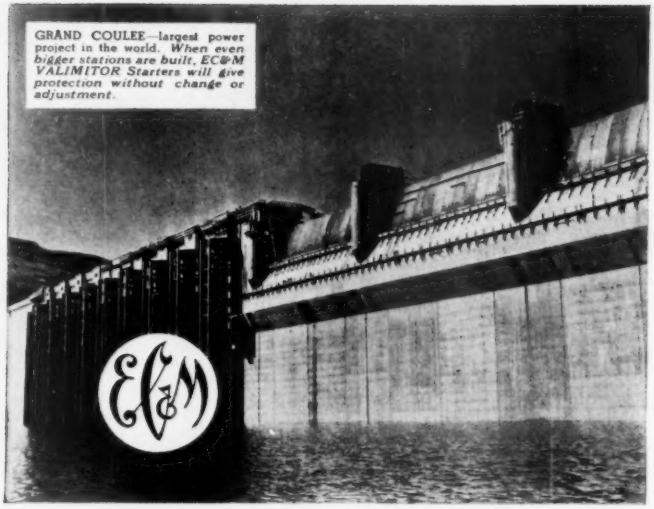
4. **PORTABLE CORDS**—General Electric Flamenol* portable cords are proving that they can take it every day on jobs like this. Thermoplastic jacket has the flexibility and strength needed for tools that are constantly in use. These cords take hard knocks and abrasion in their stride—resist acids, alkalies, water, and oil. Use Flamenol portable cords for reduced maintenance on medium- or heavy-duty tools.

5. **BUS DROP CABLE** is another tough item from General Electric's line of wires and cables—designed to take a beating in a difficult spot. Neoprene jacket takes plenty of abuse—flexes easily for installation in problem locations—stays in for a long, long time.

6. **FLEXIBLE CONDUIT** is the protection you need on motors and motor-driven tools. Wherever there's vibration or movement, use General Electric flexible conduit. Its strip-wound construction lets it move with the tool—steel gives it the strength wiring needs for protection.

These are just a few of the tough, long-life items in the complete General Electric wiring materials line. Your distributor can supply you with these or any of the other materials you need to do your job well. Ask him about them, or write for information to Section K15-234, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC


GRAND COULEE—largest power project in the world. When even bigger stations are built, EC&M VALIMITOR Starters will give protection without change or adjustment.
EC&M

Short Circuit Protection
for Today and Forever
with EC&M VALIMITOR* Starters

Now, VALIMITOR Starters to *safeguard investments* of thousands of dollars in starters and motors in public utilities, municipal pumping stations and similar high voltage applications throughout industry.

This is the answer to the short circuit problem on 2300-4600 volt motor drives. Unlike other solutions, there's *no ceiling* on EC&M VALIMITOR Protection. The starter you select today will *not* be outmoded by an increase in power supply tomorrow. And there's nothing to replace when a "short" occurs—just press the starter button to re-start.

A signal achievement, the VALIMITOR is unequalled by anything else in its field. It can be applied without survey and calculations of existing power circuit. Send only size and voltage of motor for complete information.

*Trade Mark (Volt-ampere-limitor)

EC&M

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

Headquarters for Lifting Magnets, Electric Crane Controls, and Electric Motor Starters

Before you specify

ANY MOTOR, *check these* VALLEY ADVANTAGES

- ✓ **Wide Adaptability** —sizes ½ to 75 h. p.
- ✓ **More Flexibility** in power planning
- ✓ **Takes Unusual** Power Loads
- ✓ **Drip-Proof**...Splash-Proof
- ✓ **Economical** Operation
- ✓ **Cool**
- ✓ **BALL BEARING**

Valley

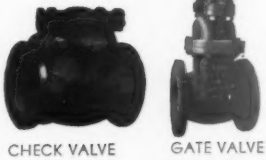
Valley Electric Corp.

4221 Forest Park Blvd. • St. Louis 8, Mo

M H

HYDRANTS, VALVES

Write for Catalog No. 34



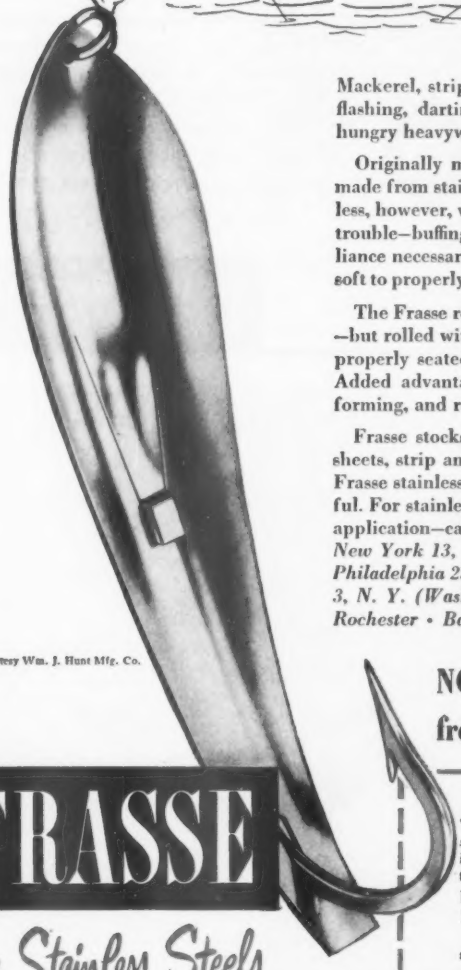
CHECK VALVE GATE VALVE

OTHER M & H PRODUCTS

Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
Tapping Sleeves
B & S Fittings
Check Valves
Floor Stands
Extension Stems
Mud Valves
Flap Valves
Sludge Shoes
Flanged Fittings

M & H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

STAINLESS "SPOON"
for a Fish's Dinner



Courtesy Wm. J. Hunt Mfg. Co.

Mackerel, stripers, sailfish, even trout go for this stainless Drone—a flashing, darting imitation of live bait, expertly designed to lure hungry heavyweights to a final meal.

Originally made of lacquered nickel-silver, these spoons are now made from stainless steel for lasting brilliance. First trials with stainless, however, were disappointing. The usual commercial grades gave trouble—buffing, even electro-polishing could not bring out the brilliance necessary for an effective lure. Again, these grades proved too soft to properly lock the hook—and hold it in the first lunge of a strike.

The Frasse recommendation was stainless steel of the same analysis—but rolled with a special temper. Result—a more rigid spoon with a properly seated hook, and a more appetizing gleam while trolling. Added advantages included production increases in stamping and forming, and reduced time cycle in polishing bath.

Frasse stocks stainless steel in every commercial form—bars and sheets, strip and tube—even valves, pipe fittings and electrodes. But Frasse stainless *engineering* service is equally handy—and just as useful. For stainless steels, and qualified engineering suggestion in their application—call Frasse. *Peter A. Frasse and Co. Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Avenue, Philadelphia 29, Pa. (Baldwin 9-9900) • 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) Jersey City • Syracuse • Hartford • Rochester • Baltimore.*

FRASSE

for Stainless Steels and Tubing

NOW! Jumbo Stainless Sheets from Warehouse Stock!

4 N

This new Frasse stock list supplement shows many new "unusual" items—*big* stainless sheets up to 72" x 144", *square* type 303 bars, *square* stainless tubing. You'll find it a handy source and reference book. Send for your copy today—no obligation.

Peter A. Frasse and Co., Inc.
17 Grand Street, New York 13, N. Y.

Please send me a copy of your new stainless stock list supplement.

Name_____

Firm_____

Address_____

MINNEAPOLIS-MOLINE
MODERN MACHINERY

INDUSTRIAL WHEELERS

Speed Material Handling and Maintenance

Preferred for OUTSIDE PLANT JOBS!

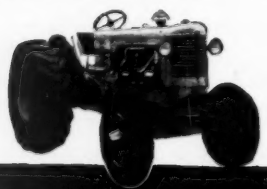
You can put loading crews on production jobs by using MM Industrial Wheelers to handle all types of bulk or palletized material with big savings in time and dollars.

Mobile MM Industrial Wheelers are available with the Shuttle Gear for 6 forward and reverse speeds up to 14.5 m.p.h.

Easy handling is the result of MM engineered Roller Spin Steering that makes fast maneuvering easy and reduces operator fatigue.

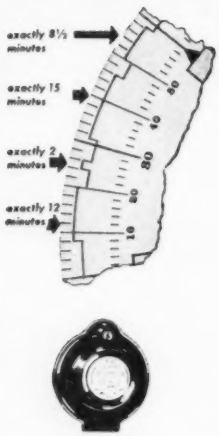
High capacity—up to 10,000 lbs. on the front end and heavy duty, extra-diameter clutches make MM Industrial Wheelers the outstanding choice for heavy industrial application.

For doing all your jobs, various attachments are available including loaders, dozers, scrapers, mowers, broom and winch. They can be installed simply and easily on mounting pads that are part of the tractor.



MINNEAPOLIS-MOLINE POWER IMPLEMENT CO.
MINNEAPOLIS 1, MINNESOTA

Process Timing



Bolt this 2 lb. Recorder right to the machine itself; let the "Process" record itself on the chart—(No ink, no pencil, no wires; the record is recorded in wax).

"The cure must be 8½ minutes"—"the heat must be applied exactly 15 minutes"—"the plating must take just 2 minutes"—"the pigment must be mixed just 12 minutes"—etc.

The *Servis Recorder* checks on this—it records just what happened—it *"times the process."* You are no longer in the dark; from now on you know all day and every day whether your *process timing* is lived up to—or if somebody slipped—if something went wrong to ruin your product for that afternoon, or that whole shift! Write for Process Timing Catalog.

THE SERVICE RECORDER CO.
1375 Euclid Avenue, Cleveland 15, Ohio.

The Servis Recorder
"The Time Clock for Machinery"

DUO-FAST

Take "The Labor" Out of Tacking

HAMMER TACKERS

DRIVE STAPLES FROM 5-32 TO 9-16" LONG
FEED AND DRIVE STAPLES AUTOMATICALLY
TACK 2 TO 4 STAPLES PER SECOND
EASY ONE HAND OPERATION

EASY TO LOAD
EASY TO CLEAN

FOR PRODUCTION WORK — wherever the job calls for tacks, switch to Duo-Fast Automatic Tackers for fast, accurate and secure tacking. With Duo-Fast at work, you save time and money. FOR YOUR SHIPPING DEPT.—Duo-Fast Automatic Tackers provide the easiest and best method of tacking protective paddings, waterproof linings, and shipping tags. Write for Catalog on all Duo-Fast Automatic Tackers.

DUO-FAST
FASTENER CORPORATION
874 Fletcher Street — Chicago 14, Illinois

"I didn't know you people made_____!"

Fill in to suit

We have been in business now for 58 years and yet quite often some good customer of our says — "Why, I didn't know you people made friction clutches!" Or the exclamation might cover skip hoist drives, car pullers, door hoists or any one of many other Jones products.

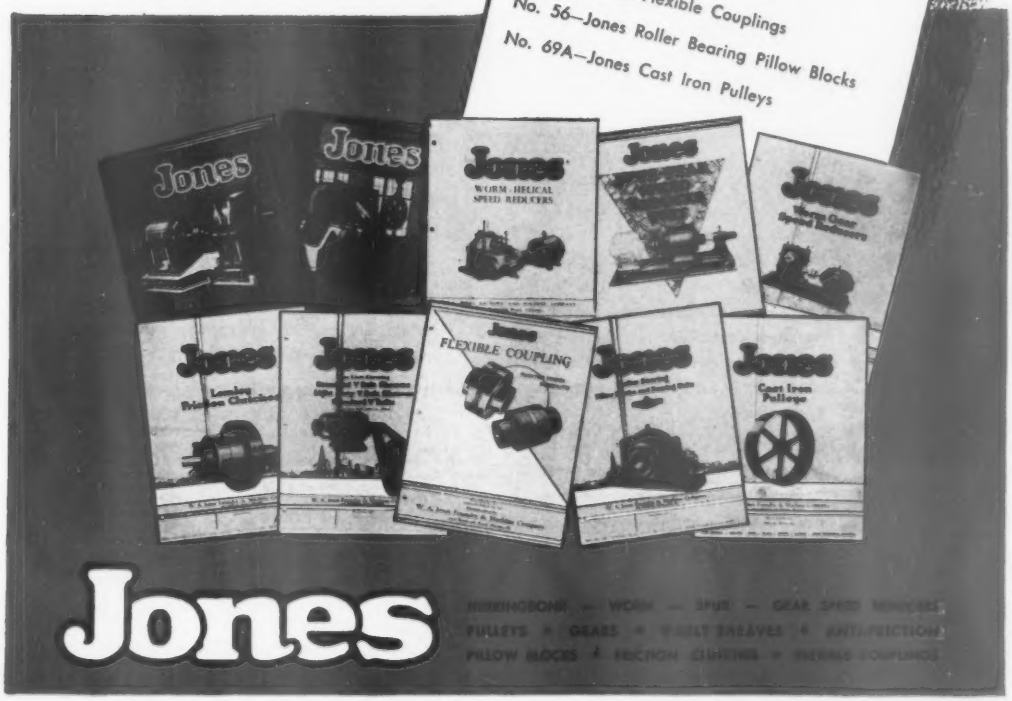
In dealing with our suppliers we often find ourselves in the same position. We establish certain buying habits and it sometimes comes as a shock to find that a firm right around the corner may have just the services or the products we need.

We therefore present the group of catalogs shown below with the thought that some one of them may help you solve some problem that has just come up.

W. A. JONES FOUNDRY & MACHINE CO.
4433 Roosevelt Rd., Chicago 24, Ill.

Any, or all of these Jones Catalogs sent on request

No. 70—Jones Herringbone Speed Reducers
No. 71—Jones Cut Gears
No. 75—Jones Worm Helical Speed Reducers
No. 55—Jones Spur Gear Speed Reducer Units
No. 68—Jones Worm Gear Speed Reducers
No. 60—Jones Friction Clutches
No. 588—Jones V-Belt Sheaves
No. 78—Jones Flexible Couplings
No. 56—Jones Roller Bearing Pillow Blocks
No. 69A—Jones Cast Iron Pulleys



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PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS

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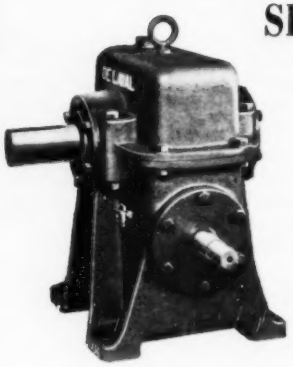

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BW400	19½	3	BW600	19½	7.5
BW400	25	2	BW600	25	5
BW400	40	1.5	BW600	40	3
BW500	11⅔	7.5	BW700	9⅔	15
BW500	19½	5	BW700	19½	10
BW500	25	3	BW700	25	7.5
BW500	60	1.5	BW700	40	5

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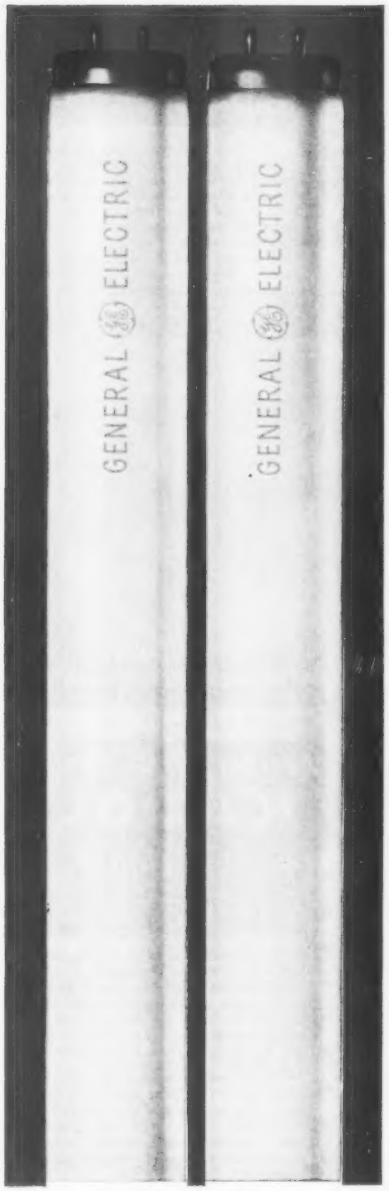

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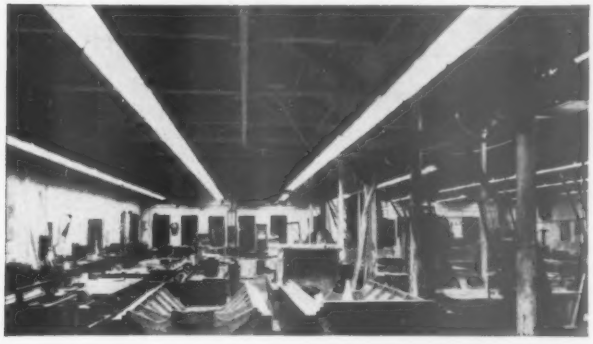

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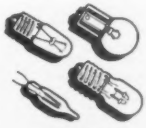

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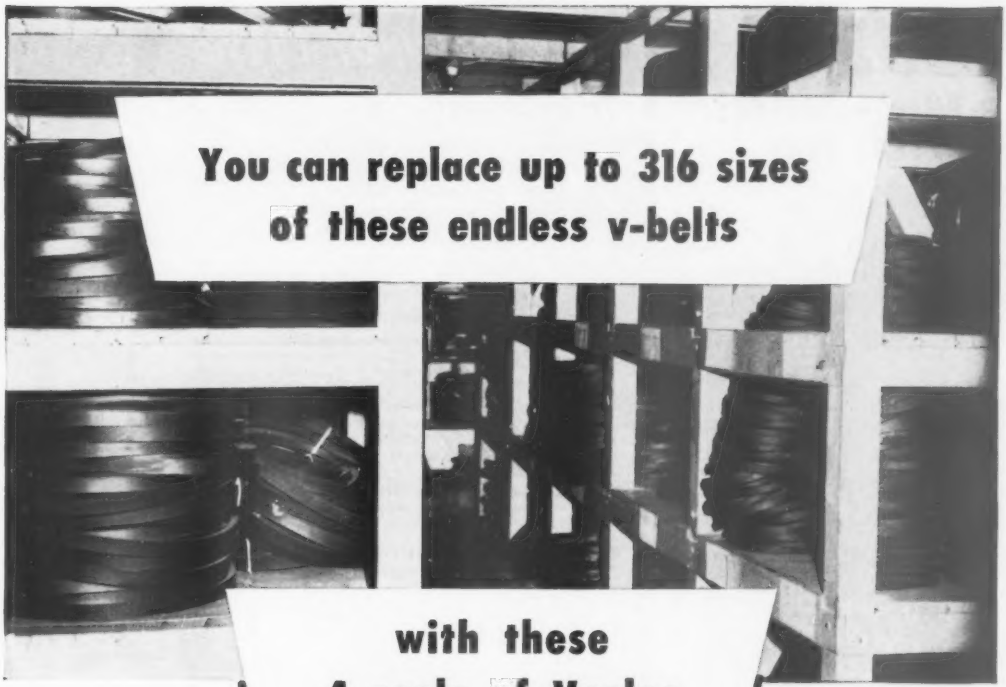

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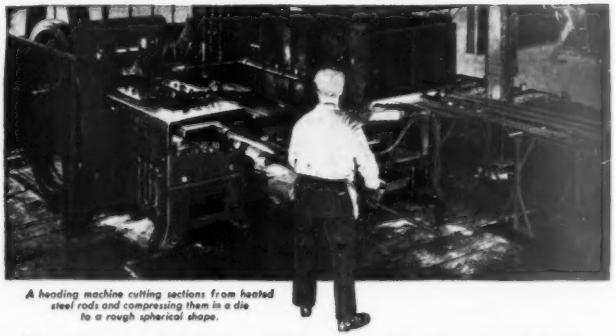

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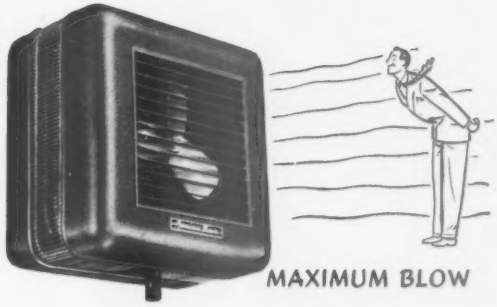

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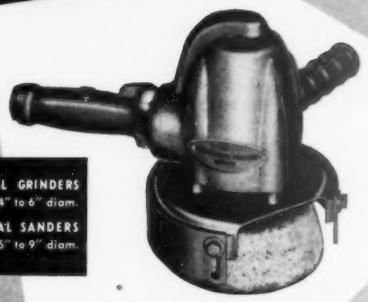

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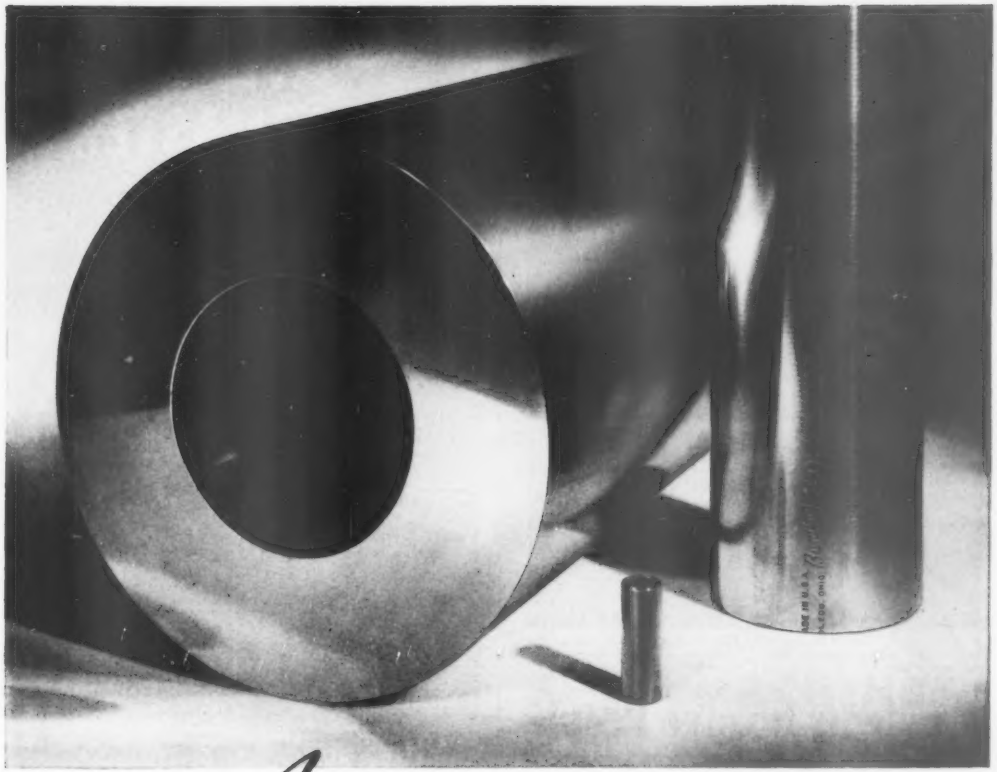

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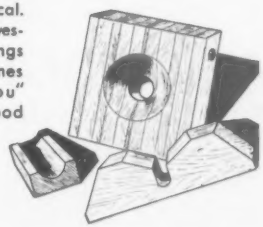

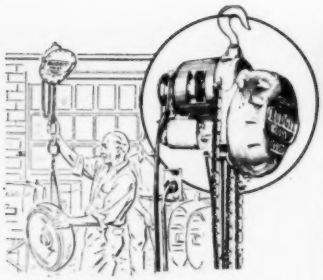

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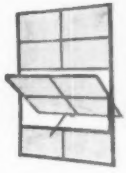

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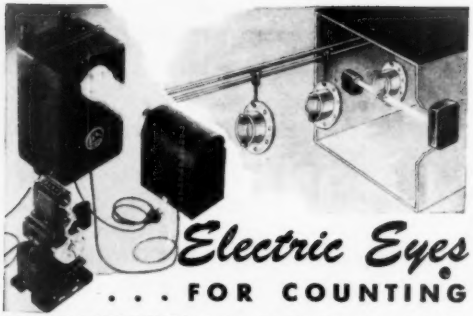

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179

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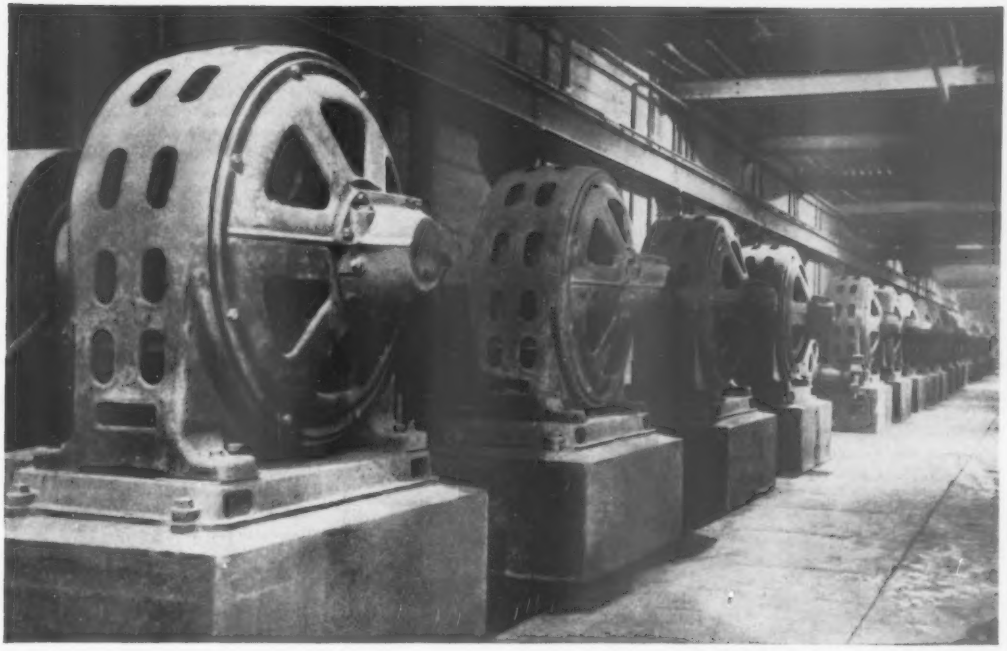

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Index To Advertisements

Abell-Howe Company 244
Abrasive Products, Inc. 148
Acme Steel Corporation 163
Adam Electric Co., Frank 55
Air Express Div., Railway Express 176
Allegheny-Ludlum Steel Corp. 169
Allen-Bradley Company ..... Insert 178, 179
Allen Company, L. B. 318
Allied Products Corporation 302
Allis-Chalmers Mfg. Co. 9, 161, 219
Aluminum Company of America 52
Alvey-Ferguson Company 214
American Abrasive Metals Co. 310
American Baler Company 314
American Blower Co. 307
American Brake Shoe Co., (National Bearing Division) 215
American Brass Company 62
American Gas Association 252
American Hoist & Derrick Company 315
American Hot Dip Galvanizers Assn., Inc. 306
American Monorail Company 238
American Mutual Liability Insurance Co. 20, 21
American Optical Company 42
American Pulley Co. 278, 293
American Screw Company 17, 207
American Structural Products Co. 59
Ampco Metal, Inc. 273
Amplex Manufacturing Co., Div. Chrysler Corp. 211
Anaconda Copper Mining Co. 58
Appleton Electric Company 196
Aro Equipment Company 188, 272
Associated Business Papers 316
Atlas Floor Surfacing Machinery Co. 310
Automatic Transportation Company 15

Baker-Raulang Company 7
Bausch & Lomb Optical Co. 258
Bear Mfg. Co. 294
Bell Aircraft Corp. 159
Blackhawk Mfg. Co. 253
Blanchard Machine Company ..... Insert 54
Boston Gear Works 174
Bradford Machine Tool Co. 49
British Industries Fair 326
Brown Instrument Div., Minneapolis Honeywell Regulator Co. 217
Brown & Sharpe Mfg. Co. 205
Bruning Company, Inc., Charles 152
Buckeye Tools Corporation 308
Buda Company 30, 31
Buell Engineering Co., Inc. 200
Buffalo Fire Appliance Corp. 202
Bull Dog Electric Products Co. 191
Bunting Brass & Bronze Company 309

Samuel Cabot, Inc. 282
Cambridge Wire Cloth Co. 212
Cardox Corporation 270
Carnegie-Illinois Steel Corp. 164
Central Screw Company 207
Century Electric Company 209
Chain Belt Company 143
Chicago Hardware Foundry Co. 244
Chic Maid Hat Mfg. Co., Inc. 244
Chicago Pneumatic Tool Co. 32
Cities Service Oil Co. 28
Clark Controller Company 255
Clark Equipment Company (Industrial Truck Division) 26, 27
Cleveland Crane & Engineering Co. 197
Cleveland Twist Drill Co. 257
Cone Automatic Machine Co., Inc. 251
Continental Screw Co. 207
Coppus Engineering Corp. 51
Corbin Screw Div., American Hdwe. Co. 207
Crane Company 199
Crawford Door Company 234
Crescent Insulated Wire & Cable Co. 158
Crescent Truck Company 262
Crocker-Wheeler Electric Mfg. Co. 24, 25
Curtis Pneumatic Machinery Co. 53

Darnell Corporation 296
Day-Brite Lighting Co., Inc. 322
Dayton Rubber Company 18, 19
De Laval Separator Company 279
De Laval Steam Turbine Co. 60, 302
Delta Manufacturing Co. 239
Detroit Steel Products Co. 313
De Vilbiss Company 57
Dick Company, A. B. 317
Dodge Manufacturing Corp. 230
Dolge Co., C. B. 304
Dow Chemical Company 206, 275
Dracco Corporation 170
DuPont de Nemours & Co., E. I. (Rayon Cordura) 263
Durant Mfg. Co. 282

Eastman Kodak Company 289
Edison Storage Battery Div. of Thomas A. Edison Co. 248
Electric Controller & Mfg. Co. 298
Electric Industrial Truck Assn. 38
Electric Products Company ..... Insert 163
Electric Storage Battery Co. 135
Electro Rust-Proofing Corp. 162
Elwell-Parker Electric Co. 10
Engineering Products Co. 312

Factory Management & Maintenance 319
Fairbanks-Morse & Company 6
Farr Company 266
Fastener Corporation 300
Federal Electric Products Co. 213
Felters Company 61
Finnell Systems, Inc. 221
Foote Bros. Gear & Machine Corp. 45
Formica 43
Fostoria Pressed Steel Co. 46
Frasse & Co., Inc., Peter A. 299

Gates Rubber Company 288
General Box Company 150
General Electric Company 34, 35
General Electric (Commercial Appliances) 204
General Electric (Electronics Dept.) 189
General Electric (Lamp Dept.) 303
General Electric Co. (Mdse. Dept.) 277, 297
Goodrich Co., B. F. 1
Gorman-Rupp Company 274
Graybar Electric Co. 5
Grinnell Company 165
Gulf Oil Company 39

Hajoca Corporation 294
Harnischfeger Corporation 187
Haskelite Mfg. Co. 265
Hein-Werner Corp. 198
Hewitt Rubber Div., Hewitt-Robins, Inc. 249
Hinde & Dauch Paper Co. 4
Hines Lumber Co., Edward 311
Hood Rubber Company 162
Howell Electric Motors Company 171
Hyatt Bearings Div., General Motors Corp. 139

Industrial Brownhoist Corp. 285
Industrial Control Div. Square D Co. ..... 157, Third Cover
Ingersoll-Rand Co. 22, 23
Inland Steel Company 186
International Business Machines Corp. 233
Interstate Drop Forge Company 260
Invincible Vacuum Cleaner Co. 218
Iowa Development Commission 208

Jeffrey Mfg. Co. 56
Jenkins Bros. 177
Johns-Manville Co. 250, 264
Johnson Bronze Company 268
Johnson & Son, Inc., S. C. 36
Johnson Steel & Wire Co., Inc. 158
Jones Foundry Co., Inc. W. A. 301
Jones & Lamson Machine Co. 256

Keasbey & Mattison Co. ..... Insert 16-B
Keller Tool Company 227
Kester Solder Company 192, 260
Kex National Service, Inc. 246
Kidde & Company, Inc., Walter 261
Kimberly-Clark Corporation 308
Kinnear Manufacturing Co. 228
Kohler Company 166
Koppers Company, Inc. 48

Ladish Company ..... Insert 162
Lewis-Shepard Products, Inc. 178
Lincoln Engineering Co. 231
Link-Belt Company 8
Lukens Steel Company 225
Lunkenheimer Company 242
Lyon Metal Products Company 44

MacRae's Blue Book Co. 222
Mahon Company, R. C. 153, 243
Manheim Manufacturing Co. 305
Manning, Maxwell & Moore, Inc. 312
Marsh Stencil Machine Co. 318
Master Electric Company ..... Fourth Cover
Masonite Corp. 210
M B Manufacturing Co. 254
McCaskey Register Company 154
McGraw-Hill Book Co. 312, 314
Mercury Mfg. Co., The 194
M & H Valve & Fitting Co. 298
Minneapolis-Honeywell Company 63

Minneapolis-Moline Power Implement Company 300
Mobilift Corporation 40
Modine Manufacturing Co. 173
Morse Chain Company 269

National Electric Products Co. ..... Second Cover
National Lock Company 207
National Screw & Mfg. Co. 207
National Supply Co. (Spang-Chalfant Div.) 185
New England Screw Company 207
Norton Company 175

Ohio Injector Company 47
Orangeville Mfg. Co. 318
Osborn Manufacturing Co. 12
Otis Elevator Co. 179
Owens-Corning Fiberglas Corp. 323
Ozalid 216

Pangborn Corporation 224, 282
Parker-Kalon Corp. 50
Pheoll Mfg. Co. 207
Phillips Screw Mfrs. 207
Photoswitch, Inc. 320
Pick Co., Inc., Albert 232
Pittsburgh-Corning Corporation 287
Pittsburgh Plate Glass (Brush Div.) 295
Pittsburgh Plate Glass (Paints Div.) ..... Insert 16-A
Pittsburgh Steel Products Co. 304
Pratt & Whitney 11
Production Instrument Company 232
Pulverized Machinery Co. 306

Quaker Rubber Corporation 155

Radio Corporation of America 29
Ready-Power Co. 168
Redington Co., F. B. 314
Reliance Electric & Engineering Co. 149
Raybestos-Manhattan, Inc. (Manhattan Rubber Division) 259
Robertson Co., H. H. 229
Roebling's Sons Co., John A. 147
Roots-Connersville Blower Corp. 137
Rust-Oleum Corporation 160
Ryerson & Son, Joseph T. 2

Safety & Maintenance Co., Inc. 14
Schramm, Inc. 226
Scovill Mfg. Co. 207
Service Recorder Company 300
Shakeproof, Inc. 207
Shenango Penn Mold Company 245
Sherwin-Williams Company 172
Simonds Abrasive Company 193
Simonds Saw & Steel Company 167
Skilsaw, Inc. 235
Smooth Ceilings System 274
Snap-on Tools Corporation 151
Southington Hdwe. & Mfg. Co. 207
Speco, Inc. 318
Square D Company ..... 157, Third Cover
Standard Conveyor Company 156
Standard Oil Company (Indiana) 195
Stanley Electric Tools 223
Steel Co. of Canada, Ltd. 207
Sterling Bolt Company 207
Sterling Electric Motors 145
Stonhard Company 325
Strom Steel Ball Co. 306
Stronghold Steel Products, Inc. 207
Stuart Oil Co., Ltd., D. A. 292
Surface Combustion Corp. 280
Synthane Corporation ..... Insert 48, 49

Taylor Company, Halsey W. 222
TelAutograph Corporation 141
Temprite Products Corp. 296
Tennant Co., G. H. 180
Texas Company 64
Thermoid Rubber Company 267
Thew Shovel Co. 183
Thomas Flexible Coupling Co. 146
Tinnerman Products, Inc. 37
Tomkins-Johnson Company 286
Toledo Scale Company 276
Towmotor Corporation 203
Trane Company 162
Truck-Man, Inc. 182
Trumbull Electric Mfg. Co. 241
Tufcrete Company 318
Tuthill Pump Co. 310

Udylite Corporation 181
Union Pacific Railroad 292
Unistrut Products Co. 184
United Chromium, Inc. 284
United States Gauge 201
U. S. Steel Subsidiaries 164

Valley Electric Corporation 298
Van Dorn Electric Tool Co. 16
Veeder-Root, Inc. 13

Wagner Electric Company 247
Walker-Turner Co. 283
Wayne Pump Company 33
Webb Co., Jerris B. 190
West Bend Equipment Company 220
Westinghouse Electric Corp. ..... Insert 32, 33, 271, 290, 291
Westinghouse Electric Corp. (Sturtevant Div.) 236, 237
Wheeler Insulated Wire Co. 240
Whiting Corporation 281
Wickwire Spencer Steel Div. Colorado Fuel & Iron Co. 41
Willson Products, Inc. 304
Wolverine Bolt Company 207

Young Radiator Co. 228

■

INDUSTRIAL CONSULTANTS 318

■

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT
Positions Vacant 320
Positions Wanted 320
Employment Services 320, 321

SPECIAL SERVICES
Contract Work 321

EDUCATIONAL
Books 321
Schools 321

EQUIPMENT
(Used or Surplus New) For Sale 321

WANTED
Equipment 321

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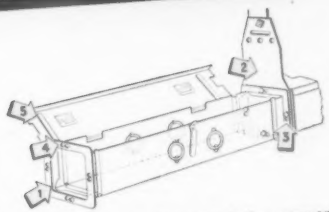

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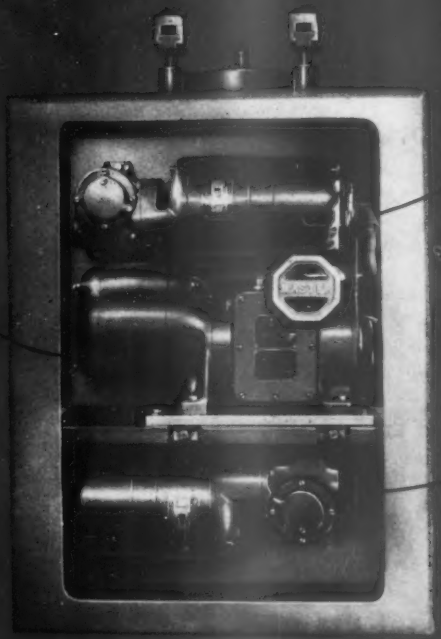

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